OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE	OF	PAGES
	1		41

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable)
Ninety Seven 097	See Blk 16		GOES N-P

6. ISSUED BY	CODE	7. ADMINISTERED BY (If other than Item 6)	CODE
NASA/Goddard Space Flight Center Bldg 6, 2nd Floor, Room W225 Greenbelt, Maryland 20771		NASA Goddard Space Flight Center DCMA Boeing Space & Comm Seal Beach El Segundo, California 90245	

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)

Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Theresa Hirahara

CODE | FACILITY CODE

(4)	9A. AMENDMENT OF SOLICITATION NO.
	9B. DATED (SEE ITEM 11)
X	10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069
	10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

N/A Amt: $0.00

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
X	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: Changes Clause 52.243-1, Alt II
	D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor s not, XXX is required to sign this document and return _2___ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

See pages 2 thru 41 for details

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
~~James T. Felicita~~ Scott R. Ingersoll Manager, NASA Contracts		James H. Geiser Jr	
15B. CONTRACTOR/OFFEROR (Signature of person authorized to sign)	15C. DATE SIGNED 04 SEP 21	16B. UNITED STATES OF AMERICA BY (Signature of Contracting Officer)	16C. DATE SIGNED 9/27/04

NSN 7540-01-152-8070
PREVIOUS EDITION UNUSABLE

30-105
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STANDARD FORM 30 (REV. 10-83)
Prescribed by GSA
FAR (48 CFR) 53.243

ORIGINAL

Changes to Performance Specification (P-Spec)

1. Make the Following Changes to: Attachment B – Performance Specification (S-415-22)

a. In Accordance with CCR 4361A, Amend Paragraph 7.2 Performance Requirements, Sub-paragraph 7.2.1 (GOES N-Q Telemetry and Command System (GTACS) Item Number 13 follows:

Delete Item Number 13 in its entirety as follows:

13. Provide processing system resource margins of 50% (e.g., CPU speed, RAM and disk capacities) for every component (excluding the GIMTACS operator workstations) when supporting three fully operational spacecraft configurations and using the full capabilities of all components (the spacecraft contractor can assume the GIMTACS/PACS replacement workstations will have this capacity). GTACS components shall have this resource margin at final delivery before the GOES-N launch.

Replace Item Number 13 as follows:

13. Provide GTACS server operational margins as defined below:
    a. System loading will simulate supporting three spacecraft configurations in a nominal, in- orbit operational configuration, exercising all system interfaces and functionality (60 real or simulated workstations creating no more than 58,000 callbacks per second). The final evaluation and verification of the acceptable margin was presented in the TA-91 final report based on the benchmark testing and extrapolation.
    b. CPU usage, as measured by system tools and averaged over a 15-minute period, shall not exceed 70% as verified in TA-91.
    c. Each server shall have an installed capacity of no less than 40 Gbytes of disk storge.
    d. The performance margin identified in a. and b. do not apply with versions of software higher than Build 6 (running under the Solaris 2.9 operating system and using the TA-91 test configuration). **(Mod97, CCR4361A)**

Waivers to Performance Specification (S-415-22)

2. Make the Following Changes to: Attachment B-Performance Specification, Appendix A-Deviation and Waiver requests as follows:

a. In Accordance with CCR 6311/ W4439, Amend Paragraph 8.4 Electromagnetic Compatibility Requirements, Sub-paragraph 8.4.11 Common Mode Noise as follows:

FROM:

8.4.11 Common Mode Noise

Common mode noise on the power lines shall be less than 0.50 volts peak-to-peak and shall be measured at the spacecraft power distribution source. An additional power line common mode noise measurement shall be made at the GFE instrument interface at the spacecraft level of assembly. Signal line noise shall be measured at the spacecraft level for signals identified in Table 3.4.3-2 of the Imager and Sounder ICDs. (MOD 41, CCR 6053A)

TO:

8.4.11 Common Mode Noise
Common mode noise on the power lines shall be less than 0.50 volts peak-to-peak and shall be measured at the spacecraft power distribution source. An additional power line common mode noise measurement shall be made at the GFE instrument interface at the spacecraft level of assembly. Signal line noise shall be measured at the spacecraft level for signals identified in Table 3.4.3-2 of the Imager and Sounder ICDs. (MOD 41, CCR 6053A); **(Note: Refer to CCR 6311, CCR6316 & CCR6325, Mod97 Deviation and Waiver (RDW) Summary in Appendix A)**

b. In accordance with CCR 6313/W4435,Amend Paragraph 3.0 – Spacecraft General Requirements, Subparagraph 3.15 – Launch Vehicle Compatibility, as follows:

FROM:

3.15 Launch Vehicle Compatibility

The GOES N-Q spacecraft shall be compatible with the Atlas and Delta launch vehicle families as described in Revision 6 of the Lockheed Martin Commercial Launch Services, Inc. *Atlas Launch System Mission Planner's Guide*, and the McDonnell Douglas Aerospace *Delta III & Boeing Delta IV Payload Planners Guide*, respectively, with the exception of the Delta III and Atlas mechanical launch environments consisting of the steady state, transient, sinusoidal, acoustic and shock environments. (CCR4358D, Mod85)

TO:

3.15 Launch Vehicle Compatibility

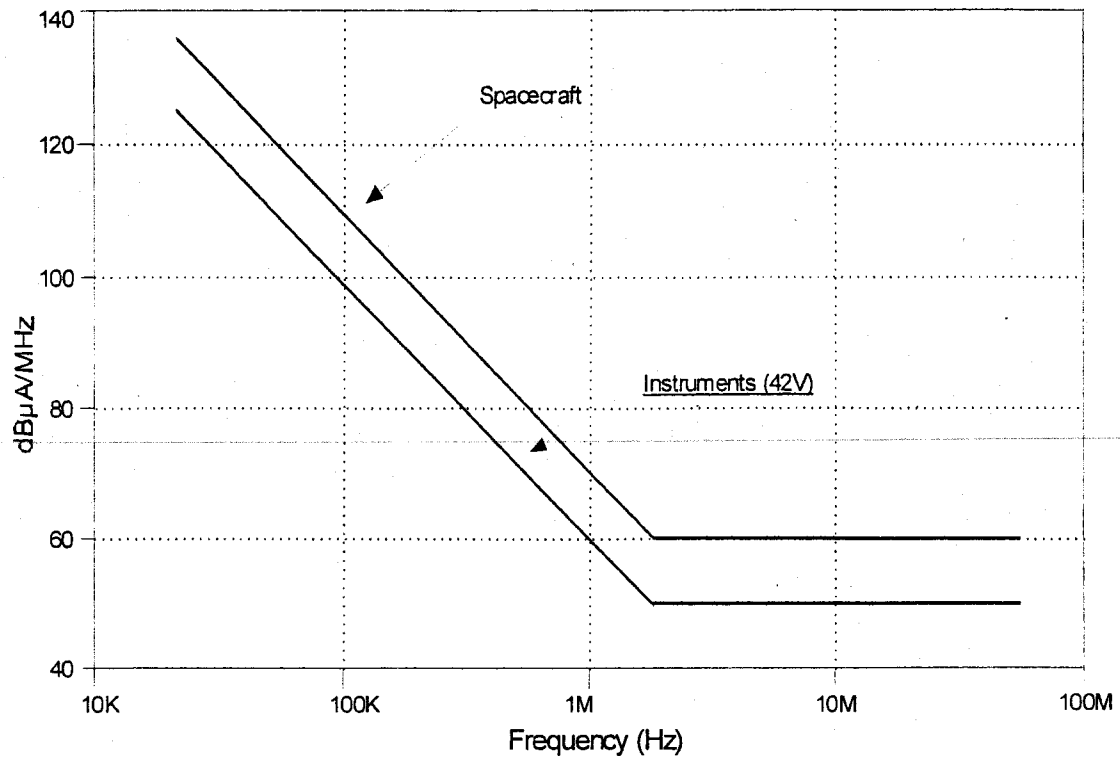
The GOES N-Q spacecraft shall be compatible with the Atlas and Delta launch vehicle families as described in Revision 6 of the Lockheed Martin Commercial Launch Services, Inc. *Atlas Launch System Mission Planner's Guide*, and the McDonnell Douglas Aerospace *Delta III & Boeing Delta IV Payload Planners Guide*, respectively, with the exception of the Delta III and Atlas mechanical launch environments consisting of the steady state, transient, sinusoidal, acoustic and shock environments. (CCR4358D, Mod85) **(Note: Refer to CCR 6313, Mod97; Deviation and Waiver (RDW) Summary in Appendix A)**

c. In accordance with CCR 6316/W4437, Amend Paragraph 8.0 – Verification Test Program, Subparagraph 8.4 – Electromagnetic Compatibility Requirements, Subparagraphs 8.4.11 – Common Mode Noise and Figure 8.4.5.2 – Broadband Conducted Emissions Limits on Spacecraft Power Lines as follows:

Note: See paragraph a above for Subparagraph 8.4.11-Common Mode Noise.

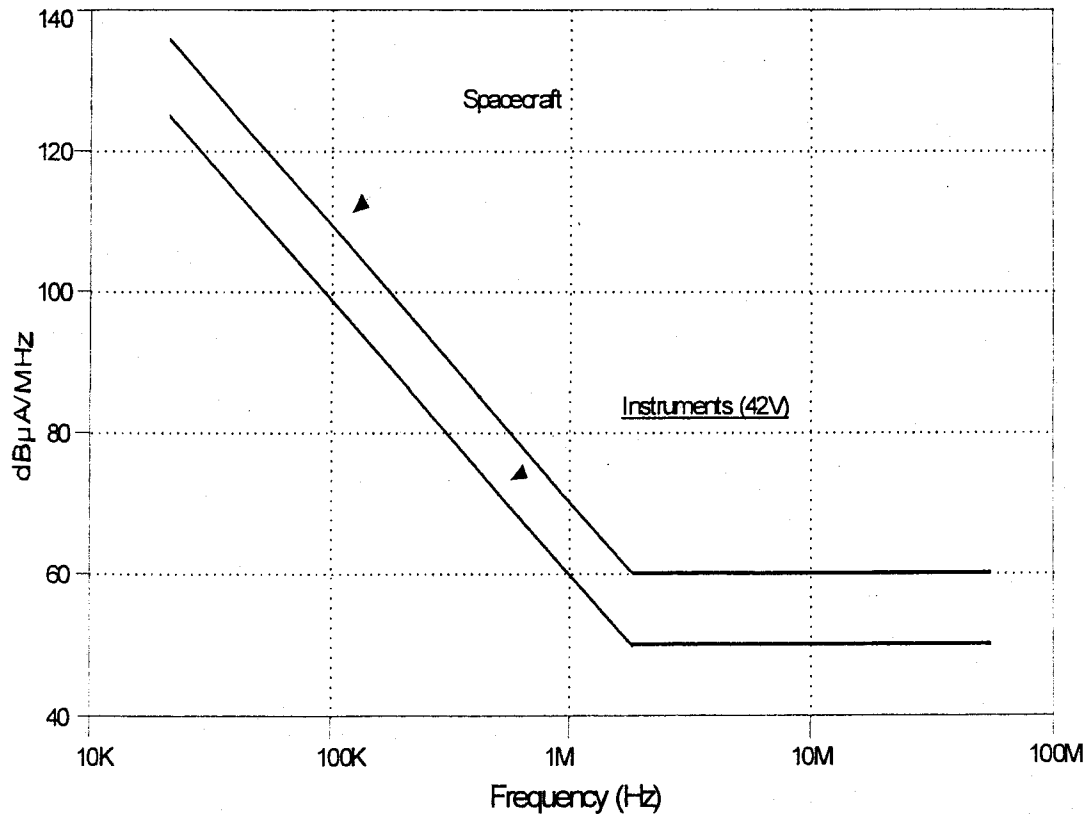
Amend Figure 8.4.5.2 as follows:

FROM:



TO:

Figure 8.4.5.2
Broadband Conducted Emission Limits on Spacecraft Power Lines



(Note: Refer to CCR 6316, Mod 97 Deviation and Waiver (RDW) Summary in Appendix A)

d. In accordance with CCR 6318/W4441, Amend Paragraph 9.0 – Instruments. Subparagraph 9.1 – Space Environment Monitoring Subsystem, Subparagraph 9.1.3 – Energetic Particle Sensor, Subparagraph 9.1.3.12 – Noise as follows:

FROM:

9.1.3.12 Noise
Noise shall not widen the effective response by more than 10 keV for electrons and protons at the thresholds below 100 keV. Above 100 keV, noise shall not widen the effective response by more than 10% of the threshold energies. Note: Refer to CCR6265B, Mod96; (Deviation and Waiver (RDW) Summary) in Appendix A

TO:

9.1.3.12 Noise
Noise shall not widen the effective response by more than 10 keV for electrons and protons at the thresholds below 100 keV. Above 100 keV, noise shall not widen the effective response by more than 10% of the threshold energies. Note: Refer to CCR6265B, Mod96; **CCR6318, Mod97 (Deviation and Waiver (RDW) Summary) in Appendix A**

e. In accordance with CCR 6324/W4448 amend Paragraph 8.0 - Verification Test Program, Subparagraph 8.2 – Magnetic Testing as follows:

FROM:

8.2 Magnetic Testing

The spacecraft shall undergo magnetic testing consisting of a permanent magnetic moment test and a stray magnetic field measurement test. The permanent magnetic moment test shall provide an unbiased estimate of the dipole moment of the unpowered spacecraft in the three coordinate axes which define the spacecraft geometry. The estimate shall be demonstrated to be repeatable (3 trials) to within the larger of 10% or 1 ampere-meter^2 per axis, peak-to-peak..

TO:

8.2 Magnetic Testing

The spacecraft shall undergo magnetic testing consisting of a permanent magnetic moment test and a stray magnetic field measurement test. The permanent magnetic moment test shall provide an unbiased estimate of the dipole moment of the unpowered spacecraft in the three coordinate axes which define the spacecraft geometry. The estimate shall be demonstrated to be repeatable (3 trials) to within the larger of 10% or 1 ampere-meter^2 per axis, peak-to-peak. **(Note: Refer to CCR 6324, Mod97; Deviation and Waiver (RDW) Summary in Appendix A)**

f. In accordance with CCR 6333/W4463 amend paragraph 9.0 – Instruments, subparagraph 9.1 – Space environment Monitor Subsystem, subparagraph 9.1.4 – Solar X-Ray Imager Interface, subparagraph 9.1.4.10 – Contaminants as follows:

FROM:

9.1.4.10 Contaminants
The primary data channel responses to penetrating electron radiation shall be calibrated separately for the energy range of 2 to 13 MeV/electron. The instrument's maximum electron flux environment is defined by the integral energy spectrum:

$$J(>E) = 7x10^5 E^{-2.3} \text{ electrons/(cm}^2 \text{ sr sec)} \qquad (2 \text{ MeV} < E < 13 \text{ MeV}).$$

Proton contamination in the alpha channels shall be < 0.1% for the total passband. Compliance with this specification shall be demonstrated both during ground test in a suitable facility and during the performance of muon spectra runs.
Note: Refer to CCR6301, Mod96; (Deviation and Waiver (RDW) Summary) in Appendix A

TO:

9.1.4.10 Contaminants
The primary data channel responses to penetrating electron radiation shall be calibrated separately for the energy range of 2 to 13 MeV/electron. The instrument's maximum electron flux environment is defined by the integral energy spectrum:

$$J(>E) = 7x10^5 E^{-2.3} \text{ electrons/(cm}^2 \text{ sr sec)} \qquad (2 \text{ MeV} < E < 13 \text{ MeV}).$$

Proton contamination in the alpha channels shall be < 0.1% for the total passband. Compliance with this specification shall be demonstrated both during ground test in a suitable facility and during the performance of muon spectra runs.
Note: Refer to CCR6301, Mod96; **CCR6333, Mod97 (Deviation and Waiver (RDW) Summary) in Appendix A**

Deviations to Performance Specification (P-Spec) (S-415-22A)

3. Make the Following Changes to: Attachment B-Performance Specification, Appendix A-Deviation and Waiver requests as follows:

a. In accordance with CCR 6312/D4436, amend Paragraph 8.0 - Verification Test Program, Subparagraph 8.6 – Structural and Mechanical Verification Requirements, subparagraph 8.6.3 – Vibroacoustic Qualification, subparagraphs 8.6.3.2 – Component Level Random Vibration Tests and 8.6.3.3 – Acceptance Requirements as follows:

FROM:

8.6.3.2 Component Level Random Vibration Tests
As a screen for design and workmanship defects, components, including the SEM instruments, shall be subjected to a random vibration test along each of three mutually perpendicular axes. In addition, an acoustic test shall be performed if any components are particularly sensitive to the acoustic environment.

The component random vibration spectrum shall be based on levels measured at the component mounting locations during previous subsystem or spacecraft testing. When such measurements are not available, the levels shall be based on statistically estimated responses of similar components on similar structures or on spacecraft analysis. In the absence of any knowledge of the expected levels, the generalized vibration test specification of Table 8.6.3.2-1 may be used. As a minimum, all components shall be subjected to the levels of Table 8.6.3.2-2.

(Note: Refer to CCRs 4102A, 4103, 6069A, 6048, Mod 40; (Deviation and Waiver (RDW) Summary) in Appendix A.

8.6.3.3 Acceptance Requirements
Vibroacoustic testing for the acceptance of previously qualified hardware shall be conducted at flight limit levels using the same duration as recommended for protoflight hardware. As a minimum, the acoustic test level shall be 138 dB, and the random vibration levels shall represent the workmanship test levels defined in Table 8.6.3.2-2.

The spacecraft shall be subjected to an acoustic test. The components and SEM instruments shall be subjected to random vibration tests in three axes. The components and SEM instruments shall be integrated prior to the spacecraft level acoustic test.

(Note: Refer to CCR6015A; (Deviation and Waiver Summary) in Appendix A)

TO:

8.6.3.2 Component Level Random Vibration Tests
As a screen for design and workmanship defects, components, including the SEM instruments, shall be subjected to a random vibration test along each of three mutually perpendicular axes. In addition, an acoustic test shall be performed if any components are particularly sensitive to the acoustic environment.

The component random vibration spectrum shall be based on levels measured at the component mounting locations during previous subsystem or spacecraft testing. When such measurements are not available, the levels shall be based on statistically estimated responses of similar components on similar structures or on spacecraft analysis. In the absence of any knowledge of the expected levels, the generalized vibration test specification of Table 8.6.3.2-1 may be used. As a minimum, all components shall be subjected to the levels of Table 8.6.3.2-2.

(Note: Refer to CCRs 4102A, 4103, 6069A, 6048, Mod 40; **CCR6312, Mod97 (Deviation and Waiver (RDW) Summary) in Appendix A.**

8.6.3.3 Acceptance Requirements
Vibroacoustic testing for the acceptance of previously qualified hardware shall be conducted at flight limit levels using the same duration as recommended for protoflight hardware. As a minimum, the acoustic test level shall be 138 dB, and the random vibration levels shall represent the workmanship test levels defined in Table 8.6.3.2-2.

The spacecraft shall be subjected to an acoustic test. The components and SEM instruments shall be subjected to random vibration tests in three axes. The components and SEM instruments shall be integrated prior to the spacecraft level acoustic test.

(Note: Refer to CCR6015A; **CCR6312, Mod97 (Deviation and Waiver Summary) in (Appendix A)**

b. In accordance with CCR 6317/D440 & CCR 6322/D4445, Amend Paragraph 10 – Spacecraft Subsystems, Subparagraph 10.11 – Contamination, Subparagraph 10.11.3 – Outgassing Requirements as follows:

Add CCR 6317 and 6322 to the end of the "Note" at the end of Paragraph 10.11.3 as follows:

FROM:

(Note: Please refer to Appendix A, Deviation and Waiver (RDW) Summary for Paragraph 10.11.3) MOD 24, CCR 6004; MOD 36, CCR 6058; MOD 40 CCR 6072, CCR 6046A, CCR 6045A; MOD 48 CCR 6074, CCR 6081, CCR 6099; MOD 53 CCR6123A; MOD 69 CCR6190, CCR6191; Mod88, CCR6254, CCR6255A &CCR6256.

TO:

(Note: Please refer to Appendix A, Deviation and Waiver (RDW) Summary for Paragraph 10.11.3) MOD 24, CCR 6004; MOD 36, CCR 6058; MOD 40 CCR 6072, CCR 6046A, CCR 6045A; MOD 48 CCR 6074, CCR 6081, CCR 6099; MOD 53 CCR6123A; MOD 69 CCR6190, CCR6191; Mod88, CCR6254, CCR6255A &CCR6256; **CCR6317, CCR6322, Mod97)**

c. . In Accordance with CCR 6325/ D4449, Amend Paragraph 8.0 - Verification Test Program 8.4 Electromagnetic Compatibility Requirements, Sub-paragraph 8.4.11 Common Mode Noise as follows:

Add CCR 6325 to Paragraph 8.4.11 (See Paragraph (a) in Waivers to Performance Specification (S-415-22A)

d. In Accordance with CCR 6326/D4450, Amend Paragraph 8.0 - Verification Test Program, subparagraph 8.5 – Vacuum, Thermal, and Humidity Verification Requirement, Subparagraph 8.5.2 – Summary of Requirements as follows:

FROM:

8.5.2 Summary of Requirements
Table 8.5.3.1-1 summarizes the tests and analyses that collectively will fulfill the general requirements of section 8.5. (CCR4313, Mod88 Admin) Deviation and Waiver (RDW) Summary in Appendix A)

The spacecraft level qualification and acceptance thermal-vacuum verification programs are the same except that a 15°C temperature margin below and above the MAT range is added in the qualification thermal-vacuum test, whereas a 5° temperature margin below and above the MAT range is added in the acceptance thermal vacuum tests.

TO:

8.5.2 Summary of Requirements
Table 8.5.3.1-1 summarizes the tests and analyses that collectively will fulfill the general requirements of section 8.5. (CCR4313, Mod88 Admin) **(Note: Refer to CCR 6326, Mod97 Deviation and Waiver (RDW) Summary in Appendix A)**

The spacecraft level qualification and acceptance thermal-vacuum verification programs are the same except that a 15°C temperature margin below and above the MAT range is added in the qualification thermal-vacuum test, whereas a 5° temperature margin below and above the MAT range is added in the acceptance thermal vacuum tests.

Changes to the Statement of Work (S-415-23)

4. Make the Following Changes to: Attachment A - Statement of Work, as follows:

a. In accordance with CCR 4361A, Amend Paragraph 3.0 – Goes Spacecraft, Subparagraph 3.5 – Spacecraft Support ground Systems (SSGS), Subparagraph 3.5.2 – Government Furnished Equipment; and Subparagraphs 3.5.4.1 – Hardware & Subparagraph 3.5.4.2 – Software as follows:

FROM:

3.5.2 Government Furnished Equipment

1. The government will provide, as GFE to the spacecraft contractor, existing GOES ground system software and databases.
2. The government will provide, as GFE to the spacecraft contractor on electronic media and hard copy form, existing ground system documentation for use during spacecraft contractor development of modified/upgraded and new/replaced ground system elements.
3. The government will provide as GFE the required WAN circuit bandwidth between the SOCC and the CDASs, to include T1 multiplexer ports and intra-facility LAN cabling.
4. The government will provide access to GOES I-M SSGS elements at the SOCC and CDASs for software installation, test and integration purposes.
5. The government will not provide ground system hardware for use at the spacecraft contractor's facility.

TO:

3.5.2 Government Furnished Equipment

1. The government will provide, as GFE to the spacecraft contractor, existing GOES ground system software and databases.
2. The government will provide, as GFE to the spacecraft contractor on electronic media and hard copy form, existing ground system documentation for use during spacecraft contractor development of modified/upgraded and new/replaced ground system elements.
3. The government will provide as GFE the required WAN circuit bandwidth between the SOCC and the CDASs, to include T1 multiplexer ports and intra-facility LAN cabling.
4. The government will provide access to GOES I-M SSGS elements at the SOCC and CDASs for software installation, test and integration purposes.
5. The government will not provide ground system hardware for use at the spacecraft contractor's facility.
6. **The government will provide thirteen (13) dual-processor, 6 GB RAM Sunfire V480 servers for GTACS upgrades defined in sections 3.5.4.1 and 3.5.4.2 with hardware depot maintenance and extended operating system maintenance. The servers will include no internal tape drives. (Mod97, CCR4361A**

Amend Paragraph 3.5.4.1, Item 1(b) as follows

FROM:

3.5.4.1 Hardware

1. The spacecraft contractor shall design, develop, install, integrate, and test all new or modified ground system hardware needed for support of the as-built GOES N-Q spacecraft. On the assumption of client-server architectures and an overall SSGS architecture similar to GOES I-M, operational on-line and redundant quantities to be delivered are as follows (or equivalent quantities depending on the selected architecture):
   a. NTACTS - Five systems at the WCDAS and two at the backup CDAS.
   a. GTACS - As a minimum, 4 servers at the SOCC, 2 servers at the WCDAS, and 1 server at the backup CDAS (7 total). The spacecraft contractor shall increase these quantities, as needed, to meet redundancy requirements. Two encrypter/decrypters each plus a spare at the SOCC and the WCDAS, and 1 at the backup CDAS (7 total). Three Programmable Telemetry Processors (PTPs) at SOCC (one as an on-the-shelf spare), two at the Wallops CDAS, and one at the Wallops Backup (WBU) facility for use as Nascom interface devices, as specified in S-415-22, paragraph 7.2.1, item 36. Each of these PTPs shall include two HSIO2 cards. PTP spares beyond these specified hardware counts are not required to be provided. One additional GTACS server and one NT client workstation for delivery to LMSAL in Palo Alto, CA. These units will later be shipped by the government to SEC and integrated with the SEC MRS&Ss. The additional GTACS server and client workstation for LMSAL are excluded from the SSGS sparing and resource margin requirements of the Performance Specification, S-415-22 and shall be a standalone node. Hardware and software maintenance for these units shall be the responsibility of the government. These requirements shall not preclude incorporation of the SEC SSGS elements (GTACS and MRS&Ss) into the SSGS network at a future date. (CCR4226C, Mod 49, CCR4284B, Mod88)

TO:

3.5.4.1 Hardware

1. The spacecraft contractor shall design, develop, install, integrate, and test all new or modified ground system hardware needed for support of the as-built GOES N-Q spacecraft. On the assumption of client-server architectures and an overall SSGS architecture similar to GOES I-M, operational on-line and redundant quantities to be delivered are as follows (or equivalent quantities depending on the selected architecture):
   a. NTACTS - Five systems at the WCDAS and two at the backup CDAS.
   b. GTACS - As a minimum, 4 servers at the SOCC, 2 servers at the WCDAS, and 1 server at the backup CDAS (7 total). The spacecraft contractor shall increase these quantities, as needed, to meet redundancy requirements. Two encrypter/decrypters each plus a spare at the SOCC and the WCDAS, and 1 at the backup CDAS (7 total). Three Programmable Telemetry Processors (PTPs) at SOCC (one as an on-the-shelf spare), two at the Wallops CDAS, and one at the Wallops Backup (WBU) facility for use as Nascom interface devices, as specified in S-415-22, paragraph 7.2.1, item 36. Each of these PTPs shall include two HSIO2 cards. PTP spares beyond these specified hardware counts are not required to be provided. One additional GTACS server and one NT client workstation for delivery to LMSAL in Palo Alto, CA. These units will later be shipped by the government to SEC and integrated with the SEC MRS&Ss. The additional GTACS server and client workstation for LMSAL are excluded from the SSGS sparing and resource margin requirements of the Performance Specification, S-415-22 and shall be a standalone node. Hardware and software maintenance for these units shall be the responsibility of the government. These requirements shall not preclude incorporation of the

SEC SSGS elements (GTACS and MRS&Ss) into the SSGS network at a future date. (CCR4226C, Mod 49, CCR4284B, Mod88)

The spacecraft contractor shall transfer responsibility of all the existing SSGS GTACS Sun Enterprise 250 servers to the government, via DD250. The government will procure and provide replacement units for GTACS servers, Sunfire V480s. These servers will include the Solaris 2.9 operating systems and all required peripherals (internal disk drives, memory, and CD-ROM drives). The government will provide depot hardware maintenance for the upgraded servers through the final acceptance of the SSGS. The spacecraft contractor shall unrack the existing GTACS servers that are being replaced. The government is responsible for the disposition of these units. The spacecraft contractor shall rack the new servers, install the GTACS software and configure them for operation at SOCC, WCDAS and WBU. The replacement GTACS servers shall be racked in the same location as the existing GTACS servers, and will reuse the preexisting power and interface cables. The spacecraft contractor shall provide filler panels as needed. The spacecraft contractor shall electronically connect, but not rack any external tape drives using GFE cables. The spacecraft contractor shall perform an installation test, based on existing regression tests, to demonstrate GTACS functionality. The government shall be responsible for the installation, configuration, monitoring and maintenance of any performance monitoring software installed on the GTACS servers. (Mod97, CCR4361A)

Amend Paragraph 3.5.4.2, Item 3 and add Item 14 as follows

FROM:

3.5.4.2 Software

1. The spacecraft contractor shall design, develop, install, integrate, and test all new GOES N-Q and modified/upgraded GOES I-M SSGS software.
2. The spacecraft contractor shall perform all on-site work without disruption to ongoing GOES operations. Government-approved, temporary failovers to the Wallops CDAS or the backup CDAS and operations from either CDAS not impacting the delivery of GOES data products are not considered disruptions.
3. Delivered commercial software products shall be at the most recent, compatible revision level (nominally three to six months) as of the date of the ground system final acceptance test, mutually agreed upon by the spacecraft contractor and the government. Where the most current software version is not used in the final acceptance test, the latest version shall be required for final acceptance unless an earlier version is acceptable to the government.
4. The spacecraft contractor shall be responsible for assuring compatibility of all delivered software with the as-built final configuration of the GOES N-Q hardware and software.
5. The spacecraft contractor shall be responsible for maintenance of all software developed under the contract until formal acceptance by the government, which is to occur no sooner than 9 months following the launch of GOES-N. The same shall apply for each subsequent spacecraft for every SSGS element requiring software changes.
6. Commercial software products shall be delivered with up-to-date valid perpetual licenses. A sufficient number of these licenses shall be provided to allow installation on all operational and spare machines for the ground system element using that software.
7. The spacecraft contractor shall validate and deliver copies of all databases required for use with the GOES N-Q spacecraft contractor, as stipulated in the CDRL GND-3.5.2-01 through GND-3.5.2-06. In addition, the spacecraft contractor shall also deliver any software tools required to develop, modify, and import databases into the GOES N-Q SSGS.

8. The spacecraft contractor shall deliver copies of all contractor-developed GOES N-Q SSGS source, object, and executable software, as per the CDRL GND-3.5.2-01 through GND-3.5.2-04, and GND-3.5.2-06. COTS software is excluded from the source and object code delivery requirement.
9. The spacecraft contractor shall deliver, with up-to-date valid licenses, two copies of each compiler needed for development and maintenance of spacecraft contractor-developed GOES N-Q SSGS software. For commercial products requiring special development licenses, two such licenses shall be provided.
10. The spacecraft contractor shall validate and deliver copies of all test and diagnostic software developed for troubleshooting, test verification, and analysis in support of spacecraft and instrument-to-ground system compatibility, as per the CDRL GND-3.5.2-01 through GND-3.5.2-06.
11. The spacecraft contractor shall deliver up-to-date valid perpetual licenses and source code (COTS software is excluded) for the Digital Wideband tape Recorder System. (CCR4226C, Mod 49)
12. Provide one each EPOCH server and NT client software and licenses to be installed on the additional LMSAL/SEC Sun Enterprise 250 server and NT workstation itemized in paragraph 3.5.4.1, item 1b. All GTACS software shall be installed on the server and client workstation as at other SSGS sites; and all GTACS servers shall be configured identically at all sites. All DID software shall be installed on the SEC DID workstation itemized in paragraph 3.5.4.1, item 1c. (CCR4226C, Mod 49)

13. For use in GRODAS, ISI will perform the following activities (at the ISI facilities): (CCR4226C, Mod 49)

(a) Install GTACS server software (Epoch Server, ABE and UNIX Client) on a government furnished Enterprise 250 server
(b) Install MRS&S server software on a government furnished Enterprise 250 server
(c) Provide GTACS NT Client software and installation procedure for subsequent installation by NASA/GSFC on two government furnished NT machines
(d) Provide DID software and installation procedure for subsequent installation by NASA/GSFC on two government furnished Sun Ultra 60 workstations (PV-Wave Run-time Version is provided by NASA/GSFC)
(e) Provide the following software licenses: One (1) GTACS Epoch Server License, Eight (8) Epoch UNIX Client Licenses, Eight (8) UNIX ABE Licenses, Two (2) GTACS NT Client Licenses
(f) Provide Copies (on CD or Tape) of ISI installed software (tasks a and b above) for back-up/re-installation purposes.

TO:

3.5.4.2 Software

1. The spacecraft contractor shall design, develop, install, integrate, and test all new GOES N-Q and modified/upgraded GOES I-M SSGS software.
2. The spacecraft contractor shall perform all on-site work without disruption to ongoing GOES operations. Government-approved, temporary failovers to the Wallops CDAS or the backup CDAS and operations from either CDAS not impacting the delivery of GOES data products are not considered disruptions.
3. Delivered commercial software products shall be at the most recent, compatible revision level (nominally three to six months) as of the date of the ground system final acceptance test, mutually agreed upon by the spacecraft contractor and the government. Where the most current software version is not used in the final acceptance test, the latest version shall be required for final acceptance unless an earlier version is acceptable to the government. **The final operating system for the delivered GTACS Sunfire V480 servers shall be Solaris 2.9. (CCR4361A, Mod97)**
4. The spacecraft contractor shall be responsible for assuring compatibility of all delivered software with the as-built final configuration of the GOES N-Q hardware and software.

5. The spacecraft contractor shall be responsible for maintenance of all software developed under the contract until formal acceptance by the government, which is to occur no sooner than 9 months following the launch of GOES-N. The same shall apply for each subsequent spacecraft for every SSGS element requiring software changes.
6. Commercial software products shall be delivered with up-to-date valid perpetual licenses. A sufficient number of these licenses shall be provided to allow installation on all operational and spare machines for the ground system element using that software.
7. The spacecraft contractor shall validate and deliver copies of all databases required for use with the GOES N-Q spacecraft contractor, as stipulated in the CDRL GND-3.5.2-01 through GND-3.5.2-06. In addition, the spacecraft contractor shall also deliver any software tools required to develop, modify, and import databases into the GOES N-Q SSGS.
8. The spacecraft contractor shall deliver copies of all contractor-developed GOES N-Q SSGS source, object, and executable software, as per the CDRL GND-3.5.2-01 through GND-3.5.2-04, and GND-3.5.2-06. COTS software is excluded from the source and object code delivery requirement.
9. The spacecraft contractor shall deliver, with up-to-date valid licenses, two copies of each compiler needed for development and maintenance of spacecraft contractor-developed GOES N-Q SSGS software. For commercial products requiring special development licenses, two such licenses shall be provided.
10. The spacecraft contractor shall validate and deliver copies of all test and diagnostic software developed for troubleshooting, test verification, and analysis in support of spacecraft and instrument-to-ground system compatibility, as per the CDRL GND-3.5.2-01 through GND-3.5.2-06.
11 The spacecraft contractor shall deliver up-to-date valid perpetual licenses and source code (COTS software is excluded) for the Digital Wideband tape Recorder System. (CCR4226C, Mod 49)
12. Provide one each EPOCH server and NT client software and licenses to be installed on the additional LMSAL/SEC Sun Enterprise 250 server and NT workstation itemized in paragraph 3.5.4.1, item 1b. All GTACS software shall be installed on the server and client workstation as at other SSGS sites; and all GTACS servers shall be configured identically at all sites. All DID software shall be installed on the SEC DID workstation itemized in paragraph 3.5.4.1, item 1c. **(CCR4226C, Mod 49)**

13. For use in GRODAS, ISI will perform the following activities (at the ISI facilities): (CCR4226C, Mod 49)
(a) Install GTACS server software (Epoch Server, ABE and UNIX Client) on a government furnished Enterprise 250 server
(b) Install MRS&S server software on a government furnished Enterprise 250 server
(c) Provide GTACS NT Client software and installation procedure for subsequent installation by NASA/GSFC on two government furnished NT machines
(d) Provide DID software and installation procedure for subsequent installation by NASA/GSFC on two government furnished Sun Ultra 60 workstations (PV-Wave Run-time Version is provided by NASA/GSFC)
(e) Provide the following software licenses: One (1) GTACS Epoch Server License, Eight (8) Epoch UNIX Client Licenses, Eight (8) UNIX ABE Licenses, Two (2) GTACS NT Client Licenses
(f) Provide Copies (on CD or Tape) of ISI installed software (tasks a and b above) for back-up/re-installation purposes.

14. GTACS Server upgrades (Mod97, CCR4361A)

(a) For the GTACS server upgrade effort the spacecraft contractor shall retain responsibility for the GTACS software maintenance of the replacement servers through final acceptance of the SSGS. The spacecraft contractor shall reuse existing EPOCH licenses.
(b) The government will provide the GTACS Sunfire V480 servers with the Sun Solaris 2.9 operating system and will provide operating system software maintenance through final acceptance of the SSGS.

b. In accordance with CCR 4364B, amend the Table of Contents and add a new section (3.11) GOES-N/O/P Program Interruption: Risk Mitigation Activities to paragraph 3.0 - GOES Spacecraft as follows:

3.11 GOES-N/O/P Program Interruption: Risk Mitigation Activities

The spacecraft contractor shall furnish the necessary personnel, facilities, services, and materials, excluding GFE instrument contractor support, required to develop and execute the pre-launch risk mitigation activities associated with the re-education and training of spacecraft contractor's personnel, the government personnel, and the instrument contractor. Development of the re-education and training materials shall be initiated prior to program interruption. The re-education and training activities shall be specific to the GOES program and shall be implemented after a program interruption.

A program interruption is defined as a six-month period after all un-launched GOES spacecraft are in ground storage, following successful completion of a pre-storage review, and two months have passed since Engineering Handover of the most recently launched GOES spacecraft.

The program interruption period ends upon the removal of the spacecraft from storage for contractually-defined post storage testing. Removing a spacecraft from storage for any addition Government-directed testing or for annual ambient testing during this period does not affect the status of a program interruption.

If the Government determines that a program interruption as defined above will occur, the Government will issue a change order to implement recurring risk mitigation activities.

3.11.1 Program Management

Spacecraft contractor shall provide Program Management personnel as defined in the baseline contract, to support an early program restart. This includes assignment of required staff to implement the risk mitigation re-education and training activities.

3.11.2 Spacecraft Integration and Test Training

3.11.2.1 Re-education and Training Package Development (pre-interruption)

The spacecraft contractor shall provide all personnel, services, and materials necessary to develop a training package that shall be used by the spacecraft contractor's spacecraft Assembly, Integration and Test personnel upon program restart. The training plan and procedures shall include training materials necessary to execute re-education and training activities defined in SOW section 3.11.2. The spacecraft contractor shall execute a dry run of selected sections of the training package, with non-GOES personnel, prior to initiation of a program interruption period.

3.11.2.2 EPOCH, NTACS, GTACS (UNIX to AI&T Team)

The spacecraft contractor shall provide all materials necessary to develop a training package and train the contractor System Test personnel in the following SSGS elements in the UNIX environment:

- EPOCH
- NTACTS
- GTACS
- NT Client

- MRS&S
- DID
- GTS
- SITE

The training package and training session shall include a ground system overview, sub-system interface diagrams, start-up/initialization, operational user's guide, fail-over/contingency, and maintenance procedures. The spacecraft contractor shall provide all personnel, materials and services necessary for this course. Version applicability shall be the version residing on the spacecraft system test STE on placement of the last spacecraft into ground storage.

3.11.2.3 Spacecraft System Post-Storage Integration and Test Training

Prior to the first program interruption, the spacecraft contractor shall develop a training package that shall be used by the spacecraft contractor's personnel in preparation for GOES spacecraft post-storage testing. The training package and training shall include post-storage integration activities, test plans, test sequence and shipment of the spacecraft to the launch facility. The sequence of events shall identify all the spacecraft test locations, fixtures, spacecraft Bus and Comm Payload STE, EGSE, MGSE, special instrumentation and software systems. Training shall include test configuration and set-up, spacecraft and instrument safeing procedures, special shipping, handling and cleanliness requirements and processes, mechanical, harness and tech/sup training requirements, contamination requirements and processes (particulate, magnetic). Training shall include dry-run execution of the spacecraft bus (including SEM) and the communication subsystem Automated Command Functional (ACF) procedures. The dry-run procedures shall use a combination of a BSE and a GOES spacecraft.

3.11.2.4 Spacecraft Thermal Vacuum (SCTV) Test Training

Prior to program interruption, the spacecraft contractor shall develop a training package that shall be used by the spacecraft contractor's personnel in support of GOES spacecraft post-storage SCTV testing. The training shall include the post-storage SCTV test plans and the sequence of events. The sequence of events shall identify all the spacecraft test locations, fixtures, GSE, special instrumentation and software systems. The training shall include test configuration and set-up, spacecraft and instrument safeing procedures, special handling and cleanliness requirements and processes, mechanical, harness and tech/sup training requirements, contamination requirements and processes (particulate, magnetic). Training shall include dry-run execution of SCTV procedures in a simulated environment. The dry-run procedures shall use a combination of a BSE and a GOES spacecraft.

Upon program restart, after an interruption, SCTV training shall be implemented only if required by SOW 3.4.10.1. If the SCTV training is not required, the spacecraft contractor shall perform additional training and tests equal to that of the SCTV test training (time and effort). The additional spacecraft test time shall be shared equally by the spacecraft contractor and the GFE instrument contractor.

3.11.2.5 Instrument Test and STE Training

Prior to program interruption, the spacecraft contractor shall develop a training package that shall be used by the spacecraft contractor's personnel and the GFE instrument contractor's personnel in support of the GOES spacecraft post-storage testing of the GFE instruments. The training shall include the post-storage instrument test plans and the sequence of events. The sequence of events shall identify all the spacecraft test locations, fixtures, GSE, special instrumentation and software systems. The training shall include test configuration and set-up, spacecraft and instrument safeing procedures, special handling and cleanliness requirements and processes, mechanical, harness and tech/sup training requirements, contamination requirements and processes (particulate, magnetic).

In preparation for post-storage functional check-out of the Imager and Sounder instruments, the spacecraft contractor shall perform an end-to-end check (continuity, isolation, visual inspection) of the cabling between the instrument test points and the RTP interface and an interface check between BSE STE and RTP, including wideband and MDL interfaces. The spacecraft contractor shall perform a full check-out of the spacecraft and BSS STE interfaces after power-up to ensure the PCM telemetry, wideband telemetry and MDL data are performing nominally. The spacecraft contractor shall provide facilities for the instrument provider to perform an RTP validation. The contractor shall provide a powered spacecraft to support the instrument provider's functional testing of the Imager and Sounder. The functional testing shall include the verification of the instruments (Imager and Sounder) Electrical Performance and the verification of the Modulation Transfer Functions. The testing shall require the set up of the Narrow Field Collimator. The functional testing shall require 13 days (39 shifts).

The spacecraft contractor shall provide facilities for the instrument provider to perform an SXI EGSE validation. The contractor shall provide a powered spacecraft to support the instruments provider's Short Form Functional and Long Form Functional Test of the SXI. This functional testing shall require 3 days (9 shifts). The spacecraft contractor shall watch the general SXI training videotape.

3.11.2.6 Spacecraft/GRODAS Data Flow Training

The spacecraft contractor shall provide all personnel, services, and materials necessary to demonstrate spacecraft data flow to GRODAS. The spacecraft contractor shall participate in two GRODAS training sessions (8 hours per session) that will include PCM data flow, PCM data retrieval, MDL wideband data flow, MDL data retrieval, and Imager and Sounder wideband data flow and processing.

3.11.3 Flight Operations and Mission Training

3.11.3.1 Re-education and Training Package Development (Pre-interruption)

The spacecraft contractor shall provide all personnel, services, and materials necessary to develop a training package that shall be used by the spacecraft contractor's Flight Operations and Mission personnel upon program restart. The training plan and procedures shall include training materials necessary to execute the re-education and training activities defined in SOW section 3.11.3. The spacecraft contractor shall execute a dry run of selected sections of the training package, with non-GOES personnel, prior to the initiation of a program interruption period.

3.11.3.2 Spacecraft Operations Training (Post-interruption)

As part of GOES program restart, after a program interruption, the spacecraft contractor shall provide all personnel, services, and materials necessary to present a training program, in accordance with CDRL OPS-3.6.1-02, to the spacecraft contractor's Flight Operations and Mission personnel. The training shall be conducted at a contractor-defined facility. The training program shall be specific to the GOES spacecraft and shall consist of a baseline 105 hours of GOES-N classroom training and an additional 5 hours of GOES O-P, if applicable. The training shall include the most recently recorded GOES-N training and any supplemental training (ie: normal mode, PLT phase) provided in S-415-23 SOW 3.6.2.6.

Summary of post-interruption training:

~ 105 hours GOES N, (baseline video tape)

~ 5 hours each for GOES O-P, if applicable (video taped)

3.11.3.3 Ground System (SSGS): EPOCH, NTACS, GTACS

The spacecraft contractor shall provide all personnel, services, and materials necessary to develop training materials for the spacecraft contractor's Flight Operations and Mission personnel. This spacecraft contractor's Flight Operations and Mission personnel shall be trained in the following SSGS elements, using an MS Windows NT environment:

- EPOCH
- NTACTS
- GTACS
- NT Client
- OATS
- GSS

The training shall include a ground system overview, sub-system interface diagrams, start-up/ initialization, operational user's guide, fail-over/contingency, and maintenance procedures. The spacecraft contractor shall use the video tapes developed by the spacecraft contractor prior to the first GOES launch.

3.11.3.4 Database Update and Delivery Process Training

The spacecraft contractor shall provide all personnel, services, and materials necessary to develop Database training materials that include the following:

- Description of the GOES SSED ICD
- Description of the GOES unique SSED schema
- Description of the GOES Database ingestion toolset (ISI provided)
- Detailed procedures for Flatfile generation, Oracle ingest, LIS file production, GSA file production, DLRV file production, Command Pacing File production, validation process and CM process
- Description of Sybase process for BSE updates

Personnel skill requirement includes basic knowledge of SSED tools and processes.

3.11.3.5 Boeing Spacecraft Emulator (BSE) Training

Spacecraft contractor shall use the BSE User/Operator Training per CDRL SDA-3.2.13-02, section 2.b for training.

3.11.3.6 Console Manual and PROC Training

The spacecraft contractor shall provide all personnel, services, and materials necessary to develop a training package and provide training of GOES LOR Console Manuals and automated procedures (PROCs). The training shall include a general walkthrough of LOR Console Manual and PROC structure as well as a process description of where to obtain configuration managed LOR flight operations product files (including upload files, teleletry pages and plots), and how to modify those files for future spacecraft. The training shall also include a hands-on walkthrough of critical sections of the LOR SOE (Sequence of Events) (e.g., first pass, stellar acquisition) using a GOES BSE to demonstrate how the console manuals and PROCs interact with the ground system to command the spacecraft. The spacecraft contractor shall execute the SSGS and BSE training prior to the console manual and proc training.

3.11.3.7 ETE Test Training

The spacecraft contractor shall provide all personnel services and materials required to train and develop an ETE test training package. The training and training package shall include test descriptions that prepare contractor personnel for execution of the Post Storage ETE and ETE-5 test. The training shall also include hands-on execution of ETE Test procedures on the BSE.

Following a program interruption, contractor personnel shall implement the ETE Test Training prior to initiation of baseline spacecraft pre-launch activities. The spacecraft contractor shall execute the SSGS and BSE training prior to the ETE test training.

3.11.3.8 Simulation / Rehearsal Training

The spacecraft contractor shall perform one dry run of the LOR rehearsal, with nominal and contingency operations, at the NASA/NOAA SOCC facility. This training shall also include network readiness tests. NASA shall provide necessary facilities to execute an LOR rehearsal at the SOCC. NASA provided rehearsal environment shall, as a minimum, provide simulation capabilities used at the control center in Suitland MD for a dress rehearsal, per S-415-23, SOW 3.6.2.4.

The spacecraft contractor shall execute the spacecraft operations training, the SSGS training, the BSE training, and the CM/Proc training prior to the rehearsal training.

3.11.4 Launch Operations Training

The spacecraft contractor, with support from the launch vehicle contractor, shall develop and present a GOES Launch Base Processing Training Package. The training shall be for spacecraft contractor personnel and the government personnel prior to the start of launch activities. The training shall include launch base activities required to prepare the GOES spacecraft for launch. The training topics shall encompass the spacecraft arrival at the Payload Processing Facility (e.g. Astrotech) through the launch countdown operations. The training package/presentation shall include:

1) Spacecraft system overview and Launch Vehicle/Spacecraft Interfaces
2) Summary of previous as-run launch campaign operations (or, for GOES-N, launch campaign planning)
3) The description of all spacecraft launch base integration and test activities presented chronologically with references to estimated duration. This shall include all spacecraft standalone and spacecraft/launch vehicle integrated activities.
4) The identification of external support requirements as applicable (e.g. purge gas analysis, fuel/oxidizer analysis, etc.)
5) The test procedure identification and description
6) The description of the Payload / Hazardous Processing Facilities (PPF/HPF) (include procedure hazardous/non-hazardous classification)
7) The description of the Launch Complex mission unique configurations in support of spacecraft operations (EGSE configurations [overview level])
8) The description of mechanical/logistical support requirements (including S/C transportation and handling)
9) The description of contamination control requirements (including purge requirements/ configurations)
10) The description of the voice/data/video communications requirements/configurations in support of spacecraft test/launch operations

11) The description of planned launch countdown support (Spacecraft personnel by function/title/ location)
12) The description of the launch-day chain of command and the anomaly resolution process (spacecraft or integrated anomalies).

The training shall also include hands-on execution of selected Launch site procedures and a CLP rehearsal. Hands on training may be performed using the BSE or Spacecraft.

(All section 3.11 new, Mod97, CCR 4364B)

c. In accordance with CCR 4370, add a new paragraph 2.2.3 to the SOW and a New table; as shown below and amend Paragraph 2.0 – Systems Engineering, Subparagraph 2.4 – Design and Performance Verification Plans and Analysis, Item 15.as follows:

2.2.3 GOES N and GOES O Pre-Launch Sell Off

The spacecraft contractor shall implement an incremental data sell off process as identified by the GOES N & GOES O System Performance Verification Matrix (PVM) (CDRL SE2.4-01). The purpose of the incremental sell off process is to formalize the government acknowledgement of the completion of the pre-launch PVM Verification activities. The spacecraft contractor shall maintain a PVM signoff log that contains initials from both the contractor and the government. The signoff of a PVM item indicates that the pre-launch verification activity is completed.

The spacecraft contractor shall furnish all necessary personnel and materials to coordinate and support the systems engineering/pre-sell off review meeting as defined in Section 2.4.15, of the SOW. Topics for these sell off systems engineering meetings shall include review of PVM line item verification and review of action closure required for verification agreement. Table 2.2.3 defines the incremental data sell off goals for the GOES N & GOES O program. The PVM signoff log showing current verification status shall be provided at the reviews indicated in Table 2.2.3. (CCR4370, Mod 97)

Table 2.2.3 GOES N & GOES O Pre-launch Data Sell Off Goals (CCR4370, Mod 97)

Milestone	Signoff Completed
Pre-Environmental Review	All spacecraft component-level and Bus & Payload Module Contract requirement verifications
Pre-Shipment Review or Pre-Storage Review (Which Ever Comes First)	All spacecraft component-level and spacecraft system-level contract requirement verifications
Launch Vehicle Pre-Ship Review	All Launch vehicle contract requirement verifications
Flight Operations Readiness Review	All SSGS and Flight Operations Contract Requirement Verifications

FROM:

2.4 Design and Performance Verification Plans and Analyses

The spacecraft contractor shall develop and maintain all necessary plans and procedures to verify that the GOES N-Q spacecraft meets all requirements described in the GOES N-Q Performance Specification S-415-22 and GFE Instrument ICDs. The spacecraft contractor shall also perform and document all analyses of the data and information from the design, development, qualification testing, acceptance testing, compatibility testing, and on-orbit testing of the spacecraft contractor's hardware and software which are required to ensure that the GOES N-Q program will meet its specifications and objectives. These tasks include, but are not limited to the following:

1. Preparing and maintaining the performance verification plan (CDRL SE-2.4-01) for use at the component, subsystem, and spacecraft level of assembly, including instrument integration and interface verification.
2. Preparing and maintaining the GOES N-Q performance verification specification as defined in CDRL SE-2.4-02.
3. Preparing and maintaining verification test procedures for use at the component, subsystem, and spacecraft level of assembly, including instrument integration and interface verification. The spacecraft test procedure requirements are described in CDRL I&T-3.4.4-01, the launch site test procedures are described in CDRL I&T-3.4.6-03, and the component/subsystem test procedures are described in CDRL SFAT-3.3.1-01.
4. Providing the effort required for data reduction and analysis of test results at the component and subsystem levels of assembly during spacecraft integration and environmental testing, and during verification of GFE instruments interfaces.
5. Providing the necessary effort for data reduction and analysis during ground system compatibility testing and during on-orbit testing.
6. Preparing verification test reports following the completion of each environmental test and test activities described in CDRL I&T-3.4.4-03.
7. Preparing documentation and providing necessary support for reviews defined in section 1.1.
8. Preparing an electromagnetic compatibility/electromagnetic interference (EMC/EMI) plan as required in CDRL SE-2.5-03.
9. Performing systems engineering and analysis in support of GFE instrument contractors' development and execution of instrument tests at the spacecraft level and launch base.
10. Developing the necessary pre-launch plans and procedures to verify that the GOES N-Q INR elements will operate as designed. This will require using the INR Performance Evaluation System (refer to section 3.2.16.1) and a combination of simulated inputs and test results to demonstrate that the on-orbit performance will achieve the specification requirements.
11. Preparing a magnetic control plan in accordance with CDRL SDA-3.2.14-02.
12. Preparing a radiation shielding and dose analysis report as defined in CDRL SE-2.5-06.
13. Performing a fields of view analysis as described in CDRL SE-2.5-02.
14. Preparing a debris generation analysis report as defined in CDRL SE-2.5-05.
15. In addition to subsystem level technical interface meetings (TIM's) required as a course of performing the tasks in this SOW, the spacecraft contractor shall furnish all necessary personnel and materials to coordinate and support up to ten (10) system level technical interface meetings (TIM's) with each held bimonthly in support of GOES N, Systems engineering activities. These activities include technical issue resolution, performance verification plan buy-offs, pending contract change requests (CCR's), CDRL data submission review/approval status, test data review, anomaly resolution activities, and test support planning. These meetings are to be held at the spacecraft contractor's facilities.. (CCR4226C, Mod 49.

TO:

2.4 Design and Performance Verification Plans and Analyses

The spacecraft contractor shall develop and maintain all necessary plans and procedures to verify that the GOES N-Q spacecraft meets all requirements described in the GOES N-Q Performance Specification S-415-22 and GFE Instrument ICDs. The spacecraft contractor shall also perform and document all analyses of the data and information from the design, development, qualification testing, acceptance testing, compatibility testing, and on-orbit testing of the spacecraft contractor's hardware and software which are required to ensure that the GOES N-Q program will meet its specifications and objectives. These tasks include, but are not limited to the following:

1. Preparing and maintaining the performance verification plan (CDRL SE-2.4-01) for use at the component, subsystem, and spacecraft level of assembly, including instrument integration and interface verification.
2. Preparing and maintaining the GOES N-Q performance verification specification as defined in CDRL SE-2.4-02.
3. Preparing and maintaining verification test procedures for use at the component, subsystem, and spacecraft level of assembly, including instrument integration and interface verification. The spacecraft test procedure requirements are described in CDRL I&T-3.4.4-01, the launch site test procedures are described in CDRL I&T-3.4.6-03, and the component/subsystem test procedures are described in CDRL SFAT-3.3.1-01.
4. Providing the effort required for data reduction and analysis of test results at the component and subsystem levels of assembly during spacecraft integration and environmental testing, and during verification of GFE instruments interfaces.
5. Providing the necessary effort for data reduction and analysis during ground system compatibility testing and during on-orbit testing.
6. Preparing verification test reports following the completion of each environmental test and test activities described in CDRL I&T-3.4.4-03.
7. Preparing documentation and providing necessary support for reviews defined in section 1.1.
8. Preparing an electromagnetic compatibility/electromagnetic interference (EMC/EMI) plan as required in CDRL SE-2.5-03.
9. Performing systems engineering and analysis in support of GFE instrument contractors' development and execution of instrument tests at the spacecraft level and launch base.
10. Developing the necessary pre-launch plans and procedures to verify that the GOES N-Q INR elements will operate as designed. This will require using the INR Performance Evaluation System (refer to section 3.2.16.1) and a combination of simulated inputs and test results to demonstrate that the on-orbit performance will achieve the specification requirements.
11. Preparing a magnetic control plan in accordance with CDRL SDA-3.2.14-02.
12. Preparing a radiation shielding and dose analysis report as defined in CDRL SE-2.5-06.
13. Performing a fields of view analysis as described in CDRL SE-2.5-02.
14. Preparing a debris generation analysis report as defined in CDRL SE-2.5-05.
15. In addition to subsystem level technical interface meetings (TIM's) required as a course of performing the tasks in this **Statement of Work**, the spacecraft contractor **(Boeing Satellite Systems)**, shall furnish all necessary personnel and materials to coordinate and support up to **seventeen (17) days of** system level technical interface meetings (TIM's) **held as required, but no less frequently than** bimonthly in support of GOES N, **O, and P** Systems engineering activities. These activities include technical issue resolution, performance verification plan buy-offs, **PVM sell-off,** pending contract change requests (CCR's), CDRL data submission review/approval status, post-test data review, anomaly resolution activities, and test support planning. These meetings **shall** be held at the spacecraft contractor's facilities, **or by telecom if acceptable to the government. The TIM Agenda shall be jointly coordinated between the spacecraft contractor**

and the government. A single meeting minutes package shall be provided to the Government following each TIM meeting. (CCR4226C, Mod 49, **CCR4370, Mod 97)**

d. In accordance with CCR 4371, Amend Paragraph 3.0 – GOES Spacecraft, Subparagraph 3.6 – Flight Operations, Subparagraph 3.6.2 – Pre-Launch Support, Subparagraph 3.6.2.6 – Training and Subparagraph 3.6.4 – Post Launch Test Support, Subparagraph 3.6.4.1 – Engineering Support During Post-Launch Test as follows:

FROM:

3.6.2.6 Training Program

The spacecraft contractor shall provide all personnel, services, and materials necessary to deliver and present a training program to the GOES N-Q government team, in accordance with CDRL OPS-3.6.1-02. The training shall be performed at a government furnished facility located near GSFC. The training program shall consist of not less than 120 hours of classroom The training shall consist of detailed subsystem analysis, including design and development overviews, detailed engineering drawing reviews, operations concepts, hardware/software interfaces, and a description of the resolution of all problems encountered in the subsystem development for which an Engineering Change Request was generated. The training shall also include interfaces with the ground system, and changes and/or upgrades that affect INR. All training presentations shall be videotaped for archival purposes. (CCR4226C, Mod 49

Phase 2 training shall provide spacecraft training for approximately 150 NASA/NOAA real-time operations, engineering, and support personnel. (CCR4226C, Mod 49

GOES-N phase 2 training shall be provided no later than 12 months before launch. For GOES O-Q, the phase 2 training shall be abbreviated to include only baseline changes and unique features or problems encountered with the specific spacecraft. For GOES O-Q the training shall be provided no later that 6 months prior to launch. The spacecraft contractor shall videotape all phase 2 training. (CCR4226C, Mod 49

The spacecraft contractor shall provide six mission operations training tools (spacecraft models 1/24 scale). The spacecraft contractor shall supply 14 additional mission operations training tools (spacecraft models 1/48 scale). (CCR4142A, Mod 29; CCR4225, Mod 43)

TO:

3.6.2.6 Training Program

The spacecraft contractor shall provide all personnel, services, and materials necessary to deliver and present a **Phase 1** training program to the GOES N-Q government team, in accordance with CDRL OPS-3.6.1-02. The training shall be performed at a government furnished facility located near **Goddard Space Flight Center**. The training program shall consist of not less than 120 hours of classroom **instruction.** The training shall consist of detailed subsystem analysis, including design and development overviews, detailed engineering drawing reviews, operations concepts, hardware/software interfaces, and a description of the resolution of all problems encountered in the subsystem development for which an Engineering Change Request was generated. The training shall also include interfaces with the ground system, and changes and/or upgrades that affect INR. (CCR4226C, Mod 49; CCR4371, Mod97)

Phase 1 training shall provide spacecraft training for approximately 150 NASA/NOAA real-time operations, engineering, and support personnel. (CCR4226C, Mod 49; CCR4371, Mod97)

Paragraph deleted (CCR4226C, Mod 49; **CCR4371, Mod97)**

The spacecraft contractor shall provide six mission operations training tools (spacecraft models 1/24 scale). The spacecraft contractor shall supply 14 additional mission operations training tools (spacecraft models 1/48 scale). (CCR4142A, Mod 29; CCR4225, Mod 43)

Summary of Phase 1 training: (not less than 120 hours total)

- **105 hours GOES N, video taped**
- **15 hours total GOES O-Q, video taped**

The spacecraft contractor shall provide two (2) additional formal GOES-N spacecraft training sessions, identical in scope to the Phase 1 formal training described above. Both of these additional sessions shall be conducted at the NOAA Suitland Federal Center. The first session shall be scheduled approximately 7 months prior to the GOES-N launch and the second session 5 months after the launch of GOES-N. The first session shall be identical in scope and material to the initial Phase 1 training, except that the materials will be updated to include any changes since the first presentation of the course. The second session shall be identical in scope and material to the first, except the materials shall be updated to incorporate lessons learned from the normal mode activation and PLT phases completed up to 60 days prior to the training. Forty (40) copies of printed training materials and 1 copy on a CD ROM shall be delivered for session No. 1. Fifty (50) copies of printed training materials and 1 copy on a CD ROM shall be delivered for session No. 2.

Summary of additional GOES-N formal spacecraft training:

- **Session 1: Updates data, not video taped; presented at L-7 months**
- **Session 2: Updates session 1 to include flight ops experience, not video taped; presented at**

  L + 5 months.

The spacecraft contractor shall provide additional training items 1 and 2 below, to occur no later than 4 months prior to launch of GOES N. This training shall cover the following areas:

1. **Additional operations training for 75 NOAA, NOAA support contractors, and new National Aeronautics and Space Administration/MOST Personnel – This training**

shall include classroom walkthroughs of the on-station routine and special operations ROP's. This training shall be up to 3 weeks (120 hours) in total duration and shall be conducted at a facility provided by the Government with equipment and software provided by the Government. Seventy-five (75) copies of printed training materials and 1 copy on a CD ROM shall be delivered.

1. **Supplemental flight software patch training – The lecture portion of this training shall include a functional description of the ACE; programmable variables, their memory address, proper method for user modification of these variables; and a description of the process of development, implementation and maintenance of flight software patches.**

Hands on flight software patch training, using a simple example and SDVE, shall be included. The hands on training shall augment lecture topics by demonstrating the patch development, implementation and maintenance process, and allowing selected students to have hands-on practice.

Both lecture and hands-on training shall be one day each, with total training no more than 16 hours in duration. This class shall be taught at a government-provided facility with government-provided equipment. Twenty (20) sets of provided materials shall be provided in printed form and 1 copy on a CD ROM.

No new training plan, or revision of the GOES N-Q training plan is required. Training material will be prepared in contractor format and delivered to the government at the start of each training event. (CCR4371, Mod97)

Amend Paragraph 3.6.4.1 as follows:

FROM:

3.6.4.1 Engineering Support During Post-launch Test

The spacecraft contractor non-resident level-of-effort engineering support shall be provided for each subsystem through the completion of PLT for GOES N-Q in support of the NASA operations team.

The spacecraft contractor resident level-of-effort engineering support shall be provided for INR through the entire PLT phase for GOES N-Q, in support of the NASA INR team. Resident support shall also be required for the telemetry and command and communication system PLTs for all GOES N-Q spacecraft.

In addition, beginning approximately 18 months prior to the GOES N launch through the end of the GOES N communications and telemetry and command PLT testing, the spacecraft contractor shall provide Comm/T&C PLT technical consultation during pre-launch PLT planning; review the PLT plans; and participate in Communications PLT working group meetings, simulations, PLT execution, and test data analysis. For the purpose of estimation, five Communications PLT working groups requiring this support shall occur. Each working group meeting shall last for a one week duration, either at the spacecraft contractor facility or via teleconference. **(CCR4226C, Mod 49; CCR4356C, Mod85)**

TO:

3.6.4.1 Engineering Support During Post-launch Test

The spacecraft contractor non-resident level-of-effort engineering support shall be provided for each subsystem through the completion of PLT for GOES N-Q in support of the NASA operations team.

The spacecraft contractor resident level-of-effort engineering support shall be provided for INR through the entire PLT phase for GOES N-Q, in support of the NASA INR team. Resident support shall also be required for the telemetry and command and communication system PLTs for all GOES N-Q spacecraft.

In addition, beginning approximately 18 months prior to the GOES N launch through the end of the GOES N communications and telemetry and command PLT testing, the spacecraft contractor shall provide Comm/T&C PLT technical consultation during pre-launch PLT planning; review the PLT plans; and participate in Communications PLT working group meetings, simulations, PLT execution, and test data analysis. For the purpose of estimation, five Communications PLT working groups requiring this support shall occur. Each working group meeting shall last for a one week duration, either at the spacecraft contractor facility or via teleconference. (CCR4226C, Mod 49; CCR4356C, Mod85)

The spacecraft contractor shall also provide additional resident support as follows:

a. **Full time ACS and flight software expertise to support the day to day operations (GOES-N only) for a period of 30 days starting immediately after handover of the spacecraft to the government. This expertise shall consist of senior spacecraft contractor engineering personnel experienced in the development and/or design of the GOES ACS hardware and flight software and in the design and operation of the flight software functions related to the following:**

    1. **Management Of All Onboard Command Buffers**
    2. **Battery Charge Management**
    3. **Buss Heater Control**
    4. **Non-INR Instrument Services**
    5. **Solar Array Steering and Stepper Motor Servo Functions**
    6. **XRP Control**
    7. **Fault Detection and Response**

These personnel shall be available to support the daily government engineering staff in monitoring, evaluating, and planning ACS and Flight software operations.

b. **On-site engineering expertise throughout PLT to support the following list of special operations involving key spacecraft subsystems:**
    1. **ACS and propulsion expertise for all station keeping maneuvers (assume 3 EW maneuvers and 1 NS maneuver)**
    2. **ACS and propulsion expertise for all station change maneuvers (assume one station change maneuver)**
    3. **ACS expertise for all yaw flips (assume two yaw flips)**
    4. **ACS and propulsion expertise for the first thruster flushing event**
    5. **ACS expertise for the magnetometer calibration event (Defined in P-Spec 9.1.1.1)**
    6. **ACS expertise for the Imager and Sounder cooler cover deployments**
    7. **Power expertise for the initial 10 days of the first eclipse season (CCR 4371, Mod 97)**

Changes to CDRLS (S-415-27)

5. **Make the Following Changes to: Attachment G-Contract Data Requirements Lists as follows:**

a. In accordance with CCR 4364B, Amend the Table of contents to add additional sections to Integration and Test, Flight Operations, and Launch Vehicle as follows. These additions will be highlighted (Bolded) and italicized:

Integration & Test

Spacecraft Test Procedures.....
Spacecraft Test Data Package.....
Performance Verification Reports.....
Launch Site Integration Plan.....
Launch Commit Criteria.....
Launch Site Test Procedures.....
Ground Operations Plan.....
Missile System Pre-Launch Safety Package.....
Transportation and Handling Plan & Procedures.....
Ground Storage Plan.....
Assembly, Integration and Test Personnel Ground System Training Package
Spacecraft System Post-Storage Integration and Test Training Documentation
Spacecraft Thermal Vacuum (SCTV) Test Training Documentation
Instrument Test and STE Training Documentation (CCR4364B, Mod97)

Flight Operations

Spacecraft Operations Handbooks.....
Spacecraft Training Program Plan.....
Spacecraft Mission Operations Plan.....
Spacecraft On-Orbit Storage Plan.....
Spacecraft De-orbit Plan.....
Spacecraft Engineering Handover Review.....
Spacecraft Launch and Orbit Raising Data Review.....
Database Update and Delivery Process Training Documentation
Console Manual and PROC Training Documentation
ETE Test Training Documentation (CCR4364B, Mod97)

Launch Vehicle

Spacecraft/Launch Vehicle Interface Control Document.....
Preliminary Mission Analysis (PMA) Report.....
Final Mission Analysis (FMA) Report.....
Booster on Stand or Pre-Vehicle on Stand (Pre-VOS) Review Data Package.....
Launch Vehicle Design Certification Review (DCR).....
Spacecraft/Launch Vehicle Interface Requirements Document.....
Mission Integration Program Kickoff Review.....
Launch Services System Effectiveness (LSSE) Program Plan.....
Launch Vehicle Requirements Review Data Package..... CCR4353(Mod85
Delta IV Launch System Training Data Package.....

Mission Unique Design Review #1Package.....
Mission Unique Design Review #2Package.....
Launch Vehicle Component and Subsystem Test Procedures .....
Launch Vehicle Component and Subsystem Test Data Packages.....
Launch Vehicle Launch Site Integration Plan.....
Launch Vehicle Pre-Installation Reviews Data Package .....
Final Loads Verification Review Data Package.....
Launch Vehicle Launch Site Test Procedures.....
Integrated Spacecraft Handling Plan .....
Launch Vehicle Pre-Shipment Review (PSR) Data Package .....
Launch Vehicle Countdown Procedures and Deviations .....
Launch Vehicle Launch Commit Criteria .....
Senior NASA Management Mission Readiness Review Data Package.....
Pre-Payload Mate Review .....
Launch Readiness Review (LRR) Data Package .....
Launch Vehicle Post Launch Data Report .....
Launch Operations Training Documentation (CCR4364B, Mod97)

b. In Accordance with the CCR 4364B, the following Table 1 – Contract Data Requirement Lists and Data Item Description pages are incorporate to include the changes above:

Table 1 Contract Data Requirement List

DATA ITEM	TITLE	SUBMISSION					HARD COPY DIST. CODE			TOTAL HARD COPIES
		A/I	FREQ	INITIAL	SUBSEQUENT	MEDIA	A	B	C	
I&T-3.4.6-03	Launch Site Test Procedures	A	Per Mission	60 days prior to PSR	U/AR	11	3	1		4
I&T-3.4.6-04	Ground Operations Plan	A		45 days prior to PDR	a) 45 days prior to CDR b) final @ L-3 mo.	11	3	1		4
I&T-3.4.6-05	Missile System Pre-Launch Safety Package	A	Per Mission	45 days prior to PDR	a) 45 days prior to CDR b) final @ L-3 mo.	11	3	1		4
I&T-3.4.9-01	Transportation & Handling Plan & Procedures	I	U/AR	5, interim @ L-12 mo.	Final @ L-3 mo.	11	4	1		5
I&T-3.4.10-01	Ground Storage Plan	I	U/AR	5	6	11	4	1		5
I&T-3.4.11-01	**Assembly, Integration and Test Personnel Ground System Training Package**	I	U/AR	90 days after launch of GOES N	GOES N Final Acceptance	11	2	2		4
I&T-3.4.11-02	**Spacecraft System Post-Storage Integration and Test Training Documentation**	I	U/AR	90 days after launch of GOES N	GOES N Final Acceptance	11	2	2		4
I&T-3.4.11-03	**Spacecraft Thermal Vacuum (SCTV) Test Training Documentation**	I	U/AR	90 days after launch of GOES N	GOES N Final Acceptance	11	2	2		4
I&T-3.4.11-04	**Instrument Test and STE Training Documentation**	I	U/AR	90 days after launch of GOES N	GOES N Final Acceptance	11	2	2		4

Notes:
1. Contract Award
2. 75 days after Contract Start Date
3. 30 days after Contract Award
4. 14 days prior to PDR
5. 14 days prior to CDR
6. Spacecraft Pre-Ship Review
7. Subsystem PDR
8. Subsystem CDR
9. HC
10. EC
11. HC & EC
12. Standard Contractor Processes/ Procedures (Data Pkg. 14 days prior)
13. Once Per Launch Vehicle Design

A/I - Approval/Information

U/AR - Update as Required

HC/EC - Hardcopy/Electronic copy

* - Review Copies

Table 1 Contract Data Requirement List

DATA ITEM	TITLE	SUBMISSION					HARD COPY DIST. CODE			TOTAL HARD COPIES
		A/I	FREQ	INITIAL	SUBSEQUENT	MEDIA	A	B	C	
OPS-3.6.4-01	**Database Update and Delivery Process Training Documentation**	I	U/AR	30 days prior to launch of GOES N	GOES N Final Acceptance	11	2	2		4
OPS-3.6.4-02	**Console Manual and PROC Training Documentation**	I	U/AR	30 days prior to launch of GOES N	GOES N Final Acceptance	11	2	2		4
OPS-3.6.4-03	**ETE Test Training Documentation**	I	U/AR	30 days prior to launch of GOES N	GOES N Final Acceptance	11	2	2		4
	PERFORMANCE ASSURANCE									
PA-3.7.1-01	Not Assigned									
PA-3.7.1-02	Previously Qualified Hardware and Software Report	A		4	5	11	4	1		5
PA-3.7.1-03	Safety Noncompliance Report	A	As generated			11	2	1		3
PA-3.7.1-04	System Safety Program Plan	A	U/AR	4		11	2	1		3
PA-3.7.1-05	Operations Hazards Analysis	A	U/AR	4		11	2	1		3

Notes:
1. Contract Award
2. 75 days after Contract Start Date
3. 30 days after Contract Award
4. 14 days prior to PDR
5. 14 days prior to CDR
6. Spacecraft Pre-Ship Review
7. Subsystem PDR
8. Subsystem CDR
9. HC
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13. Once Per Launch Vehicle Design

A/I - Approval/Information

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* - Review Copies

Table 1 Contract Data Requirement List

DATA ITEM	TITLE	SUBMISSION					HARD COPY DIST. CODE			TOTAL HARD COPIES
		A/I	FREQ	INITIAL	SUBSEQUENT	MEDIA	A	B	C	
LV-3.8-21	Launch Vehicle Countdown Procedures and Deviations	A	Per Mission	In Accord. with EWR 127-1	U/AR	11	4	1		10
LV-3.8-22	Launch Vehicle Launch Commit Criteria	A	Per Mission	Wet Dress Rehersal -2 Days	L -7 Days	11	4	1		10
LV-3.8-23	Senior NASA Management Mission Readiness Review Data Package	I	Per Mission	L -1 Month		11	4	1	40	45
LV-3.8-24	Pre-Payload Mate Review	I	Once Per Mission	12		11	4	1	20	25
LV-3.8-25	Launch Readiness Review (LRR) Data Package	I	Per Mission	L -1 Day		11	4	1	40	45
LV-3.8-26	Launch Vehicle Post Launch Data Report	I	Per Mission	Prelim. L +10 Days	Final L +60 Days	11	4	1		5
LV-3.8-29	**Launch Operations Training Documentation**	I	U/AR	**2 months after launch of GOES N**	**GOES N Final Acceptance**	11	2	4		6

Notes:
1. Contract Award
2. 75 days after Contract Start Date
3. 30 days after Contract Award
4. 14 days prior to PDR
5. 14 days prior to CDR
6. Spacecraft Pre-Ship Review
7. Subsystem PDR
8. Subsystem CDR
9. HC
10. EC
11. HC & EC
12. Standard Contractor Processes/ Procedures (Data Pkg. 14 days prior)
13. Once Per Launch Vehicle Design

A/I - Approval/Information
U/AR - Update as Required
HC/EC - Hardcopy/Electronic copy
* - Review Copies

DATA ITEM DESCRIPTION		2. NUMBER	I&T-3.4.11-01
1. TITLE	Assembly, Integration and Test Personnel Ground System Training Package	3. DATE	4/21/03

4. DESCRIPTION/PURPOSE

The spacecraft contractor shall develop a training package to train the spacecraft contractor System Test personnel in the SSGS elements in the UNIX environment.

5. DATA REQUIREMENTS

The I&T training package shall include the following elements:

- EPOCH
- NTACTS
- GTACS
- NT Client
- MRS&S
- DID
- GTS
- SITE

The training package shall include a ground system overview, sub-system interface diagrams, start-up/initialization, operational user's guide, fail-over/contingency, and maintenance procedures.

6. SPECIAL PREPARATION INSTRUCTIONS

(Mod97, CCR 4364B)

DATA ITEM DESCRIPTION		2. NUMBER	I&T-3.4.11-02
1. TITLE	Spacecraft System Post-Storage Integration and Test Training Package	3. DATE	4/21/03

4. DESCRIPTION/PURPOSE

The spacecraft contractor shall develop a training package that shall be used by the spacecraft contractor's personnel in preparation for the spacecraft post-storage testing.

5. DATA REQUIREMENTS

The spacecraft post-storage training package shall include post-storage integration activities, test plans, test sequence and shipment of the spacecraft to the launch facility. The sequence of events shall identify all the spacecraft test locations, fixtures, spacecraft Bus and Comm Payload STE, EGSE, MGSE, special instrumentation and software systems. The training package shall include test configuration and set-up, spacecraft and instrument safeing procedures, special shipping, handling and cleanliness requirements and processes, mechanical, harness and tech/sup training requirements, contamination requirements and processes (particulate, magnetic).

6. SPECIAL PREPARATION INSTRUCTIONS

(Mod 97, CCR4364B)

DATA ITEM DESCRIPTION		2. NUMBER	I&T-3.4.11-03
1. TITLE	Spacecraft Thermal Vacuum (SCTV) Test Training Documentation	3. DATE	4/21/03

4. DESCRIPTION/PURPOSE

The spacecraft contractor shall develop a training package that shall to be used by the spacecraft contractor's personnel in support of the spacecraft post-storage SCTV testing.

5. DATA REQUIREMENTS

The training package shall include the post-storage SCTV test plans and the sequence of events. The sequence of events shall identify all the spacecraft test locations, fixtures, GSE, special instrumentation and software systems. The training package shall include the test configuration and set-up, spacecraft and instrument safing procedures, special handling and cleanliness requirements and processes, mechanical, harness and tech/sup training requirements, contamination requirements and processes (particulate, magnetic).

6. SPECIAL PREPARATION INSTRUCTIONS

(Mod 97, CCR4364B)

DATA ITEM DESCRIPTION		2. NUMBER	I&T-3.4.11-04
1. TITLE	Instrument Test and STE Training Documentation	3. DATE	4/21/03

4. DESCRIPTION/PURPOSE

The spacecraft contractor shall develop a training package to be used by the spacecraft contractor's and the GFE instrument contractor's personnel in support of the spacecraft post-storage testing of the GFE Instruments.

5. DATA REQUIREMENTS

The training package shall include the post-storage instrument test set up plans and checkout as defined in Test Procedure # 903 (Imager and Sounder Test Configuration Support) and Test Procedure # 904 (SXI Test Configuration Support). The plans shall identify all the spacecraft test locations, fixtures, GSE, special instrumentation and software systems. The training shall include test configuration and set-up, special handling and cleanliness requirements and processes, mechanical, harness and tech/sup training requirements, contamination requirements and processes (particulate, magnetic). The imager and sounder instrument tests that complement TP # 903 are as follows:

Test Description	ITT Test #
EP Full Imager	8176982
EP Full Sounder	8176981
Coherent Noise	8177042
Vis/Star Cal Im	8176989
Vis/Star Cal Sndr	8176988
System MTF Im	8177028
MTF IGFOV Sndr	8177020
Dyn coreg/shear	8177014
Manual Deploy I/S	8177056
Hinge Friction I/S	8177055

The SXI tests that complement TP # 904 are as follows:

Test Description
SXI Short Form Functional Test (SFFT)
SXI Long Form Functional Test (LFFT)

The training package shall also include documentation that addresses the following:

- Retrieval of test point cable set from storage
- Inspection and IR/Continuity checks of the test point cables
- The routing of the test point cables from GFCR into the test area
- The movement of the RTP from storage to the test area
- The integrated checkout of RTP to GTACS/Spacecraft interfaces (T&C, Wideband, and MDL).

6. SPECIAL PREPARATION INSTRUCTIONS__**(CCR4364B, Mod97)**

DATA ITEM DESCRIPTION		2. NUMBER	OPS-3.6.4-01
1. TITLE	Database Update and Delivery Process Training Documentation	3. DATE	4/21/03

4. DESCRIPTION/PURPOSE

The spacecraft contractor shall develop a database training package that shall be used to train the mission operations personnel in the database update and delivery process.

5. DATA REQUIREMENTS

The database training package shall include training documentation on the following:

- Description of the GOES SSED ICD
- Description of the GOES unique SSED schema
- Description of the GOES Database ingestion toolset
- Detailed procedures for Flatfile generation, Oracle ingest, LIS file production, GSA file production DLRV file production, Command Pacing File production, validation process and CM process.
- Description of Sybase process for BSE updates

6. SPECIAL PREPARATION INSTRUCTIONS

(Mod97, CCR4364B)

DATA ITEM DESCRIPTION		2. NUMBER	OPS-3.6.4-02
1. TITLE	Console Manual and PROC Training Documentation	3. DATE	4/21/03

4. DESCRIPTION/PURPOSE

The spacecraft contractor shall develop a training package for the use of the GOES LOR Console Manuals and automated procedures (PROCs).

5. DATA REQUIREMENTS

The training shall include a general overview/walkthrough of the LOR Console Manual and PROC structure as well as a process description of where to obtain configuration managed LOR flight operations product files (including upload files, telemetry pages and plots), and how to modify those files for future spacecraft. The training package shall address the LOR SOE (Sequence of Events) (e.g., first pass, stellar acquisition) to detail how the console manuals and PROCs interact with the ground system.

6. SPECIAL PREPARATION INSTRUCTIONS

(Mod97, CCR4364B)

DATA ITEM DESCRIPTION		2. NUMBER	OPS-3.6.4-03
1. TITLE	ETE Test Training Documentation	3. DATE	4/21/03

4. DESCRIPTION/PURPOSE

The spacecraft contractor shall develop an ETE test training package that will describe how to set up for and execute an end to end test between the spacecraft contractors integration and test facility and the SOCC.

5. DATA REQUIREMENTS

The ETE training package shall include test descriptions that will prepare the mission operations and I&T personnel for the execution of the Post Storage ETE and ETE # 5 tests. The training shall document the following:

- El Segundo Portable Telemetry Processor (PTP) set up and use
- El Segundo / SOCC / CCAFS Network description
- Spacecraft configuration in the High-Bay
- STE setup and configuration
- Description of ETE Test and functionality
- Description of Test Software and Execution

6. SPECIAL PREPARATION INSTRUCTIONS

(Mod97, CCR4364B)

DATA ITEM DESCRIPTION		2. NUMBER	LV-3.8-29
1. TITLE	Launch Operations Training Documentation	3. DATE	4/21/03

4. DESCRIPTION/PURPOSE

The spacecraft contractor shall develop a GOES specific Launch Base Processing Training Package. The training is intended for the spacecraft contractor personnel and the government personnel prior to the start of launch activities.

5. DATA REQUIREMENTS

The training package shall include launch base activities required to prepare the GOES spacecraft for launch. The training topics shall encompass the spacecraft arrival at the Payload Processing Facility (e.g. Astrotech) through the launch countdown operations. The training package shall include:

1) Spacecraft system overview and Launch Vehicle/Spacecraft Interfaces
2) Summary of previous as-run launch campaign operations (or, for GOES-N, launch campaign planning)
3) The description of all spacecraft launch base integration and test activities presented chronologically with references to estimated duration. This shall include all spacecraft standalone and spacecraft/launch vehicle integrated activities.
4) The identification of external support requirements as applicable (e.g. purge gas analysis, fuel/oxidizer analysis, etc)
5) The test procedure identification and description
6) The description of the Payload /Hazardous Processing Facilities (PPF/HPF) (include procedure hazardous/non-hazardous classification).
7) The description of the Launch Complex mission unique configurations in support of spacecraft operations (EGSE configurations [overview level])
8) The description of mechanical/logistical support requirements (including S/C transportation and handling)
9) The description of contamination control requirements (including purge requirements/ configurations)
10) The description of the voice/data/video communications requirements/configurations in support of spacecraft test/launch operations
11) The description of planned launch countdown support (Spacecraft personnel by function/title/ location)
12) The description of the launch-day chain of command and the anomaly resolution process (spacecraft or integrated anomalies).

6. SPECIAL PREPARATION INSTRUCTIONS

(Mod97, CCR4364B)

Changes to the SXI ICD (DS80667-H00-011)

6. Make the Following Changes to: Attachment E of the Interface Control Document for the Solar X-Ray Imager (SXI) as follows:

a. In accordance with CCR 4362:

Add serial numbers and part numbers for the GOES O spare SXI model to the Interface Control Document. Revise paragraph 2.2.1 and Table 3.3.1-1.

b. In accordance with CCR 6323:

Revise the SXI Interface Control Document. To clarify sine vibration test requirements for unit and at spacecraft level. Revise paragraph 3.4.3.1 and Tables 3-5, 3-6, and 3-7.

Changes to Sounder Interface Control Document. (DS80667-H00-012)

7. Make the following Changes to: Attachment D of the Sounder Interface Control Document. As follows:

a. In accordance with CCR 6314D:

Change the Sounder Interface Control Document. To call out a 250 angstrom EOL requirement for the molecular contamination on the filter wheel sunshield OSR's. Revise Paragraph 3.6.2.3.

b. In accordance with CCR 7038:

Change the wideband data signal characteristics in the Imager/Sounder Interface Control Document. To match the values predicted by the worst case analysis. Revise table 3.5.3-1.

c. In accordance with CCR 7090:

Reduce the interference level on the input power bus to -31.5 dBVrms from 1.9kHz to 26 kHz to allow the sounder instruments to meet the requirement limits with margin. Revise paragraph 3.4.3.3 and figure 3.4.3-2.

d. In accordance with CCR 7099A:

Change the Heater harness due to incorrect ICD. This change is covered by Task Assignment 116. Revise paragraph 5.7 Item b, of page 5-129 and the drawing page reference 3-3003A).

Waivers to Sounder ICD (DS80667-H00-012)

8. Make the following changes to Attachment D of the Sounder ICD as follows:

a. In accordance with CCR 6315/W4443:

Waiver W4443 is issued for the out of specification limits for the signal line noise measurement requirements as tested during the safe-to-mate test. Revise table 3.4.3-2.

b. In accordance with CCR 7093:

A waiver is issued for the ICD maximum of 69.55 pound weight for the Sounder, SN 10 electronics module by .34 pounds. Revise Table 3.2.1-1.

Changes to Imager ICD (DS80667-H00-010)

9. Make the following changes to Attachment C of the Imager ICD as follows:

a. In accordance with CCR 7038:

Change the wideband data signal characteristics in the Imager/Sounder ICD's to match the values predicted by the worst – case analysis. Revise Table 3.5.3-1.

b. In accordance with CCR 7100A:

Correct the backup patch heater provisions in the Imager ICD for S/Ns 09 and up to GOES O&P. This change is covered under Task Assignment 116. Revise paragraph 5.11 of page 5-213 and (drawing reference 3-294A.).

Waivers to Imager ICD (DS80667-H00-010)

10. Make the following changes to Attachment C of the Imager ICD as follows:

a. In accordance with CCR 6315/W4443:

Waiver W4443 is for an out of specification limits for signal line noise measurement requirements as tested during the safe-to-mate test. Revise Table 3.4.3-2

11. The Following CCRs are added to this contract by reference:

CCR 4361A	GTACS Upgrade
CCR 4362	Add GOES O Spare SXI Serial and Part Numbers to the ICD.
CCR 4364B	Program Interruption Risk Mitigation Plan
CCR 4370	Incremental Sell-off meeting (Mod 83)
CCR 4371	Operations Training and PLT Support (Mod 84)

CCR 6311	Common Measurement at Instrumental Interfaces (W4439)
CCR 6312	Solar Array Drive (SAD) Vibration
CCR 6313	AFT Omni Interface with Atlas III Envelope (W4435)
CCR 6314D	Sounder Filter Wheel Cooler Contamination Requirements Change
CCR 6315	Imager Sounder Safe to Mate Signal Line Noise
CCR 6316	GOES N EMI/EMC Limit Outages
CCR 6317	Out gassing of Avery 8217 Pressure Sensitive Adhesive
CCR 6318	EPEAD D3 Detector Noise Exceedence
CCR 6322	Out Gassing of Mono-Coat E179 N-ODS
CCR 6323	SXI – Sine Vibration Test Requirements Clarification
CCR 6324	GOES O Magnetic Dipole Repeatability (W4448)
CCR 6325	Common Measurement at Instrument Interfaces (S4449)
CCR 6326	SEM Instrument Maximum Temperatures in SCTV
CCR 6333	S/N 004 HEPAD Proton Containnation in Alpha Channels
CCR 7038	Change to Wideband Data Output Characteristics
CCR 7090	EMI CS01 Limits
CCR 7093	Sounder El3ectronic Box Mass Properties
CCR 7099A	Revise Sounder Backup Heater PIN designation in Wiring harness diagram (Rework and Test Covered under Task Assignment 116, H.4 clause
CCR 7100A	Revise Imager Backup Heater PIN designation in Wiring harness diagram (Rework and Test Covered under Task Assignment 116, H.4 clause

12. Change Pages

Revise J-1, List of Attachments See Change Page J-1
Revised SOW (CD-ROM Attached)
Revised P-Spec (CD-ROM Attached)
Revised CDRL (CD-ROM Attached)
Mod 97 Change Summary

The fixed price of this contract and the funds allotted for the performance thereof, shall not be deemed to be increased by this modification.

Inconsideration of the modifications, including, but not limited to, all waivers, deviations, and Government provided accommodations, agree to herein as complete and equitable adjustments for all work required by this modification and configuration change requests (CCRs) referenced herein, and as being technically equivalent under Clause H.15 of the contract. The contractor hereby releases the Government from any and all liability under this contract for further equitable adjustments attributed to such facts and circumstances giving rise to this modification and the CCR's referenced herein.

End of Modification 097

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF PAGES 2

2. AMENDMENT/MODIFICATION NO. Ninety ~~Five~~ 098

3. EFFECTIVE DATE See Blk 16

4. REQUISITION/PURCHASE REQ. NO. 4200057842

5. PROJECT NO. (If applicable) GOES N-P

6. ISSUED BY CODE

NASA/Goddard Space Flight Center
Bldg 6, 2nd Floor, Room W225
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE

NASA Goddard Space Flight Center
DCMA Boeing Space & Comm Seal Beach
El Segundo, California 90245

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)

Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Theresa Hirahara

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

6100.2550 51 51R-616-41-5729-01 FC300221 514150 51-616 SAEX22004R 100004381 $20,000,000.00

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: Changes Clause 52.243-1, Alt II

D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor s not, XXX is required to sign this document and return _2___ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

See page 2 for details

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)
James T. Felicita
Manager, NASA Contracts

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
James H. Geiser Jr

15B. CONTRACTOR/OFFEROR
James T. Felicita
(Signature of person authorized to sign)

15C. DATE SIGNED 7/30/2004

16B. UNITED STATES OF AMERICA
BY
(Signature of Contracting Officer)

16C. DATE SIGNED 8/2/04

The purpose of this modification is to:

1. Incrementally fund the contract
2. Add the Boeing Individual Subcontracting plan for GOES N-P, Revision 6
3. Provide a completely re-numbered contract

1. Revise Clause H.6, Limitation of funds as Follows:

From:	$606,635,868.00	(Mod 92)
By:	20,000,000.00	
To:	$626,635,868.00	(Mod 98)

Accounting and Appropriation Data:

Purchase Requisition No. 4200057842

6100.2550 51 51R-616-41-5729-01 FC300221 514150 51-616 SAEX22004R 100004381

2. Add to Section J, Attachment J, Master Subcontracting Plan D950-10755-1, Revision 6 as follows:

Delete: Attachment J in its entirety and replace with:

Attachment J	Small, Small Disadvantage and Women Owned Small Business Subcontracting Plan	Dated : 14 July 2004

Attachment J above, represents a complete and equitable adjustment for the above changes to the subcontracting plan as set forth in Attachment J. The Contractor (BSS) hereby releases the Government from any and all liability under this contract for further equitable adjustment attributable to such facts and circumstances giving rise to Contractor's revised subcontracting plan #SC97-04-H, Dated July 14, 2004.

Mod 98

INDIVIDUAL SUBCONTRACTING PLAN

DATE: 7/30/04 **PLAN #** SC97-04-I

CONTRACT/RFP #: NAS5-98069

BOEING REFERENCE #: L0226

MODIFICATION # Revision #6, Consolidation of GOES N, O and P Subcontracting Plans

REFERENCE: Boeing's FY 2004-2006 Master Subcontracting Plan - Document No. D950-10755-1

Boeing's FY 2004-2006 Master Subcontracting Plan, Document No. D950-10755-1 is hereby incorporated and applies company-wide to The Boeing Company, including its subsidiaries. The plan contains all elements required in Subcontracting Plans by FAR 52.219-9 except goals. The FY 2004-2006 plan has been approved for use during fiscal year 2004, beginning October 1, 2003, through fiscal year 2006, ending September 30, 2006. This Individual Subcontracting Plan is issued pursuant to the Master Subcontracting Plan and shall apply to the prime contract throughout the life of the contract and to any prime contract changes, modifications and options.

Approval:

Diane Dougherty

Diane Dougherty

Small Business Programs Manager

Boeing Satellite Systems

INDIVIDUAL SUBCONTRACTING PLAN

Submitted By:	
Group	Boeing Satellite Systems, Inc.
Address	P.O. Box 92919
City, State	Los Angeles, California 90009
Plan Administrator:	Patricia A. Williams
Title	Subcontract Manager
Location	W/S25/C551
Telephone	(310) 662-6270
Small Business Programs Manager:	
Name	Diane Dougherty
Location	W/S13/G351
Telephone	(310) 364-7605
Contract Administrator:	James T. Felicita
Title	Manager, NASA Contracts
Location	W/S25/C550
Telephone	(310) 416-4244
Principal Contracting Officer:	Clelia Walker
Agency	NASA Goddard Space Flight Center
Address	Greenbelt, MD 20770
Telephone	(301) 286-1351
Administrative Contracting Officer:	J.D. Butler
Agency	Defense Contract Management Agency
Location	W/S52/Z109
Telephone	(310) 364-5874

INDIVIDUAL SUBCONTRACTING PLAN

DATE: 7/9/04 **PLAN #** SC97-04-H

CONTRACT/RFP #: NAS5-98069

BOEING REFERENCE #: L0226

MODIFICATION # Revision #6, Consolidation of GOES N, O and P Subcontracting Plans

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Location	W/S52/Z109
Telephone	(310) 364-5874

1. CONTRACT INFORMATION

Contract/RFP No.	NAS5-98069
Description	Consolidation of Individual Plans
Period of Performance	2/01/98 – 12/30/07
Effective Date of Contract	2/01/98
Change No. 6	Date: 6/29/04

2. VALUES

Total Current Contract Value	$ 726,996,978	100%
Planned Subcontract Dollars	$ 403,563,221	55.511
Domestic Subcontract Dollars	$ 400,763,221	55.13%.

3. GOALS

For the purpose of this individual subcontracting plan, the following separate percentage goals are hereby expressed in terms of a percentage of the total planned domestic subcontract dollars. These planned subcontract dollars include all first tier subcontracts to be awarded in the performance of this contract.

BSS hereby commits to perform to their best efforts to meet or exceed the following goals:

PLANNED SUBCONTRACT BASE:	AMOUNT	PERCENT
1. Total Dollars	$ 400,763,221	100 %
2. To Large Business	$ 368,890,624	92.05 %
3. To Small Business	$ 31,872,597	7.95 %

SMALL BUSINESS CONCERNS:	AMOUNT	PERCENT OF ITEM 1 TOTAL
4. Small Disadvantaged Business	$ 7,371,709	1.84 %
5. HBCUs/MIs	$ 0	0 %
6. Small Woman Owned Business	$ 3,717,437	0.93% %
7. Veteran Business	$ N/A	N/A %
8. Service-Disabled Veteran Business	$ N/A	N/A %
9. HUBZone Business	$ N/A	N/A %

COMMENTS RELATIVE TO STATED GOALS:
This Small Business Plan Revision No. 6 captures costs associated with ECD-2D consisting of costs to large business concerns. The majority of the costs are for ISI, a large business concern and computer related equipment to Sun Computers, also a large business concern. There are no opportunities for Small Business or Small Women Owned business Concerns.

The GOES N, O and P satellites are in the integration and test phases, with the majority of parts procurements being completed. The GOES P. As a result of unanticipated purchases and a conscientious effort by the contractor to further the Government's objectives to ensure maximum participation by small business concerns in prime contracts, BSS is confident that goals will be largely achieved at contract completion. BSS will continue to explore opportunities to procure products and services from small business concerns with remaining procurement dollars.

Due to the nature of the contract, no goals were identified for Historically Black Colleges, HUBZone Small Businesses, Veteran-owned Small Business Concerns, or Service-Disabled Veteran-owned Small Business Concerns and no expenditures for these categories have been reported.

4. MODIFICATIONS

Upon receipt of a modification to this contract exceeding the $500,000 threshold, ($1,000,000 for construction), Boeing will promptly negotiate applicable revisions to the appropriate subcontract goal reflecting those changes.

5. TECHNICAL ASSISTANCE TO SMALL BUSINESS CONCERNS

In addition to those actions described in the Master Subcontracting Plan, the following specific efforts will be undertaken to ensure these concerns receive an opportunity to participate in the performance of this contract as subcontractors and to aid in the achievement of the above stated goals:

6. PRINCIPAL PRODUCTS AND SERVICE AREAS

Appendix A attached hereto contains a description of the principal supply and service areas scheduled to be subcontracted and identification of those areas anticipated to be subcontracted to small business concerns.

7. PLAN ADMINISTRATOR

Responsibility for the implementation and administration of this subcontracting plan is vested in the responsible Plan Administrator whose name appears on the cover sheet. Hughes reserves the right to

substitute another qualified individual as Plan Administrator should the need arise. The duties of the Plan Administrator shall include but not be limited to the following:

a) Prepare small business subcontracting plans that include percentage goals, a description of efforts facilitating small business participation, and assurances that subcontracts contain flow-down provisions.

b) Assure Materiel contract briefs disclose terms and conditions of the company concerning small business plans including provisions for incentive award fees and reporting requirements and make certain that such briefs are distributed to all performing organizations.

c) Ensure that small business capabilities are adequately considered and that such firms are listed as potential sources on the make-or-buy plan.

d) Bring to management's attention any matter that could impair accomplishment of goals specified in subcontracting plans that might adversely affect the company.

APPENDIX A

PRINCIPAL PRODUCTS AND SERVICE AREAS BY BUSINESS SIZE CATEGORIES

HE anticipates procurement of the following listed products and services from the following categories of business concerns:

PRODUCTS/SERVICES		ALL SMALL BUSINESS CONCERNS				
	LARGE	SB	SDB	OTHER*	SWOB	HUBZONE
Launch Services	X					
Instruments MLI		X				
Ground Support System Upgrades		X				
EDDS Administration					X	
Electrical Assy and Fabrication, Software, Structures, Fittings, Mechanisms, Hi-Rel Parts	X	X	X		X	
Engineering Services, Integration and Test	X	X	X		X	
Test Equipment	X	X	X		X	

Legend:

SB = Small Business
SDB = Small Disadvantaged Business
Other* =

a) HBCU/MI = Historically Black Colleges and Universities, and Minority Institutions
b) Veteran Business
c) Service-Disabled Veteran Business

SWOB = Small Women Owned Business
HUBZone = Historically Underutilized Business Zone

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6. PRINCIPAL PRODUCTS AND SERVICE AREAS

Appendix A attached hereto contains a description of the principal supply and service areas scheduled to be subcontracted and identification of those areas anticipated to be subcontracted to small business concerns.

7. INDIRECT COSTS

Goals are structured using only identifiable materials and services, which are chargeable directly to the specific prime contract. Common usage type materials are not bought or recorded under specific

contracts. Indirect costs incurred for common or joint purposed may be allocated on a prorated basis to the contract. Sound business, cost effective practices dictate that such products are bought into inventory accounts and charged out on as "as issued" basis.

8. PLAN ADMINISTRATOR

Responsibility for the implementation and administration of this subcontracting plan is vested in the responsible Plan Administrator whose name appears on the cover sheet. Boeing reserves the right to substitute another qualified individual as Plan Administrator should the need arise. The duties of the Plan Administrator shall include but not be limited to the following:

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Instruments MLI		X				
Ground Support System Upgrades		X				
EDDS Administration					X	
Electrical Assy and Fabrication, Software, Structures, Fittings, Mechanisms, Hi-Rel Parts	X	X	X		X	
Engineering Services, Integration and Test	X	X	X		X	
Test Equipment	X	X	X		X	

Legend:

SB = Small Business
SDB = Small Disadvantaged Business
Other* =

a) HBCU/MI = Historically Black Colleges and Universities, and Minority Institutions
b) Veteran Business
c) Service-Disabled Veteran Business

SWOB = Small Women Owned Business
HUBZone = Historically Underutilized Business Zone

Exhibit 2

SMALL BUSINESS PROGRAMS ADMINISTRATORS

Boeing Satellite Systems

Diane Dougherty
Small Business Programs Manager
Bldg. S13, MS G351
P.O. Box 92919
Los Angeles, CA 90009

Tele: (310) 364-7605
Fax: (310) 416-6836
e-mail. diane.dougherty@boeing.com

ELECTRON DYNAMICS DIVISION

Mollie L. Mulcrone
Small Business Programs Administrator
Bldg. 230 MS 2165
P.O. Box 2999
Torrance, CA 90509-2999

Tele: (310) 517-6105
Fax: (310)517-5736
e-mail: mollie.mulcrone@boeing.com

SPECTROLAB, INC.

Nancy Mason
Small Business Programs Administrator
Bldg. SL/727/SYLMAR
12500 Gladstone Avenue
Sylmar, CA 91342-5373

Tele: (818) 898-2855
Fax: (818) 898-7500
e-mail: n.mason@spectrolab.com

Exhibit 2

SMALL BUSINESS PROGRAMS ADMINISTRATORS

Boeing Satellite Systems

Diane Dougherty
Small Business Programs Manager
Bldg. S13, MS G351
P.O. Box 92919
Los Angeles, CA 90009

Tele: (310) 364-7605
Fax: (310) 416-6836
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ELECTRON DYNAMICS DIVISION

Mollie L. Mulcrone
Small Business Programs Administrator
Bldg. 230 MS 2165
P.O. Box 2999
Torrance, CA 90509-2999

Tele: (310) 517-6105
Fax: (310)517-5736
e-mail: mollie.mulcrone@boeing.com

SPECTROLAB, INC.

Nancy Mason
Small Business Programs Administrator
Bldg. SL/727/SYLMAR
12500 Gladstone Avenue
Sylmar, CA 91342-5373

Tele: (818) 898-2855
Fax: (818) 898-7500
e-mail: n.mason@spectrolab.com

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE	OF	PAGES
	1		2

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable)
099 Ninety - Nine	See Blk 16		GOES N-P

6. ISSUED BY CODE

NASA/Goddard Space Flight Center
Bldg 6, 2nd Floor, Room W225
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE

NASA Goddard Space Flight Center
DCMA Boeing Space & Comm Seal Beach
El Segundo, California 90245

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)

Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Theresa Hirahara

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (if required)

N/A Amt: $0.00

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(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

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C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

X D. OTHER Specify type of modification and authority)
Clause H.4--Additional Goverment. Accommodations

E. IMPORTANT: Contractor XXX is not, is required to sign this document and return ____copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

See page 2 for details

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
		James H. Geiser Jr	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
(Signature of person authorized to sign)		BY (Signature of Contracting Officer)	7/30/2004

1. The purpose of this modification is to change clause F.2 of the Engineering Handover Date.

In accordance with Clause H.4, Additional Government Accommodations, paragraph g of contract NAS 5-98069, the contractor (BSS) is hereby notified of a revision to the Engineering Handover date for the GOES O Spacecraft. This modification serves to fulfill the Governments contractual obligation to amend the contract via modification and to notify the contractor (BSS) of a revised EHD of 15 months in advance of the current Engineering Handover Date.

As stated in Clause F.2 of Contract NAS 5-98069, the Engineering Handover Date for the GOES O is hereby changed from December 31, 2005 to March 31, 2006.

2. Replace the contract areas listed below with the enclosed revised change pages.

Page F-3

The fixed Price of this contract, and the funds allotted for the performance therof, shall not be deemed to be increased by the modification. This modification also represents a complete and equitable settlement for the work associated with this change and releases the Government from any and all liability under this contract for further equitable adjustment attributable to such facts and circumstances giving rise by this modification, except as provided for in Clause H.4(g).

End of Modification

F.2 ENGINEERING HANDOVER DATES AND STORAGE DATES

The following dates are defined as the engineering handover dates and the earliest dates at which the spacecraft may be placed into ground storage:

	Earliest Ground Storage Date	Engineering Handover Date
GOES N	January 1, 2002	December 31, 2004
GOES O	January 1, 2003	March 31, 2006
GOES P	January 1, 2005	April 30, 2007

The contractor shall place each GOES spacecraft or replacement spacecraft into storage, if required, at the contractor's facility immediately following successful completion of spacecraft Integration and Test (I&T) (including integration and test of the delivered GFE instruments) and successful completion of the pre-storage review, but no earlier than the dates specified for Earliest Storage Date (ESD). No storage charges, as defined in Clause H.4, shall be paid prior to the ESD or for any storage resulting from delays in the Contractor-provided launch.

(End of clause)

F.3 SECTION F CLAUSES INCORPORATED BY REFERENCE

(52.242-15) STOP-WORK ORDER (AUG 1989)
(52.247-34) F.O.B. DESTINATION (NOV 1991)

(End of By Reference Section)

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF PAGES 2

2. AMENDMENT/MODIFICATION NO. One-Hundred 100

3. EFFECTIVE DATE See Blk 16

4. REQUISITION/PURCHASE REQ. NO. See Page Block 14

5. PROJECT NO. (If applicable) GOES N-P

6. ISSUED BY CODE
NASA/Goddard Space Flight Center
Bldg 6, 2nd Floor, Room W225
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE
NASA Goddard Space Flight Center
DCMA Boeing Space & Comm Seal Beach
El Segundo, California 90245

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)
Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Scott Ingersoll

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

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D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor s not, XXX is required to sign this document and return _2___ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

4200074276: 6100.2550 51 51R-616-41-5729-01 FC400000 514150 51-616 SAEX22004R 100004381 **$14,922,404.00**
4200085411: 6100.2550 51 51R-616-41-5729-01 FC400000 514150 51-616 SAEX22004R 100004381 **$23,000,000.00**
4200084782: 6100.2550 51 51R-616-41-5729-01 FC400000 514150 51-616 SAEX22004R 100004381 **$ 77,596.00**
$38,000,000.00

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)
Mr. Scott Ingersoll
Manager, NASA Contracts

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
James H. Geiser Jr

15B. CONTRACTOR/OFFEROR
Scott Ingersoll
(Signature of person authorized to sign)

15C. DATE SIGNED 04 SEP 30

16B. UNITED STATES OF AMERICA
(Signature of Contracting Officer)

16C. DATE SIGNED 10/5/04

NSN 7540-01-152-8070
PREVIOUS EDITION UNUSABLE

30-105
Computer Generated

STANDARD FORM 30 (REV. 10-83)
Prescribed by GSA
FAR (48 CFR) 53.243

The purpose of this modification is to incrementally fund the contract through April 30, 2005

1. Revise Clause H.6, Page Limitation of funds as Follows:

From:	$626,635,868.00	(Mod 98)
By:	38,000,000.00	
To:	$664,635,868.00	

2. Revise Clause H.6, Paragraph (c) (1) from October 31, 2003 to April 30, 2005

3. Accounting and Appropriation Data: See Block 14 on Standard Form 30 (Page 1).

3. Change Page: H.7 (Attached)

The fixed Price of this contract, and the funds allotted for the performance thereof, shall not be deemed to be increased by the modification. This modification also represents a complete and equitable settlement for the work associated with this change and releases the Government from any and all liability under this contract for further equitable adjustment attributable to such facts and circumstances giving rise by this modification, except as provided for in Clause H.4(g).

End of Modification

e. Subcontractor Reporting

FAR clause 52.219-9 and NASA FAR Supplement clause 18-52.219-75 require that the Contractor ensure that SF 294 and SF 295 reports are submitted by those subcontractors that have been required to adopt a Subcontracting Plan under the terms of the clause. These subcontractor reports must be submitted as required by paragraphs (c) and (d) above. The reports may be submitted through the Contractor or submitted directly. Regardless, the Contractor is responsible for ensuring proper and timely submittal of the required reports.

(End of clause)

H.6 LIMITATION OF FUNDS (FIXED-PRICE CONTRACT) (18-52.232-77) (MAR 1989)

(a) The sum of $664,635,868.00 is presently available for payment and allotted to this contract. It is anticipated that from time to time additional funds will be allocated to the contract in accordance with the following schedule, until the total price of said item is allotted:

SCHEDULE FOR ALLOTMENT OF FUNDS

Date	Amounts
September 21, 2004	$38,000,000.00

(b) The Contractor agrees to perform or have performed work on the items specified in paragraph (a) above up to the point at which, if this contract is terminated pursuant to the Termination for Convenience of the Government clause of this contract, the total amount payable by the Government (including amounts payable for subcontracts and settlement costs) pursuant to paragraphs (f) and (g) of that clause would, in the exercise of reasonable judgment by the Contractor, approximate the total amount at the time allotted to the contract. The Contractor is not obligated to continue performance of the work beyond that point. The Government is not obligated in any event to pay or reimburse the Contractor more than the amount from time to time allotted to the contract, anything to the contrary in the Termination for Convenience of the Government clause notwithstanding.

(c) (1) It is contemplated that funds presently allotted to this contract will cover the work to be performed until April 30, 2005.

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF PAGES 2

2. AMENDMENT/MODIFICATION NO.: 101 One-hundred one

3. EFFECTIVE DATE: See Blk 16

4. REQUISITION/PURCHASE REQ. NO.: N/A

5. PROJECT NO. (If applicable): GOES O

6. ISSUED BY — CODE
NASA/Goddard Space Flight Center
Bldg 6, 2nd Floor, Room W225
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) — CODE
NASA Goddard Space Flight Center
DCMA Boeing Space & Comm Seal Beach
El Segundo, California 90245

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)
Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE | FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
N/A — Amt: $0.00

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

X D. OTHER Specify type of modification and authority)
Clause H.4--Additional Goverment. Accommodations

E. IMPORTANT: Contractor XXX is not, is required to sign this document and return ____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

See page 2 for details

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
James H. Geiser Jr

15B. CONTRACTOR/OFFEROR
(Signature of person authorized to sign)

15C. DATE SIGNED

16B. UNITED STATES OF AMERICA
BY (Signature of Contracting Officer)

16C. DATE SIGNED 11/1/2004

1. The purpose of this modification is to change clause F.2 of the Engineering Handover date.

In accordance with Clause H.4—Additional Government Accommodations, paragraph (g) of contract NAS 5-98069, the Contractor (BSS) is hereby notified of a revision to the Engineering Handover Date (EHD) for the GOES O Spacecraft. This notification serves to fulfill the Government's contractual obligation to amend the contract via modification and to notify the contractor (BSS) of a revised EHD 15 months in advance of the current Engineering Handover Date.

As stated in Clause F.2 of contract NAS 5-98069, the Engineering Handover for the GOES O is hereby changed from March 31, 2006 to June 30, 2006.

2. Replace the contract areas listed below with the enclosed revised change page.

Page F-3

The fixed Price of this contract and the funds allotted for the performance thereof shall not be deemed to be increased by the modification. This modification also represents a complete and equitable settlement for the work associated with this change and releases the Government from any and all liability under this contract for further equitable adjustment attributed to such facts and circumstances giving rise by this modification, except as provided for in Clause H.4(g).

End of Modification

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF PAGES 23

2. AMENDMENT/MODIFICATION NO.: One-hundred Two (102)

3. EFFECTIVE DATE: See Blk 16

4. REQUISITION/PURCHASE REQ. NO.: N/A

5. PROJECT NO. (If applicable): GOES N

6. ISSUED BY — CODE
NASA/Goddard Space Flight Center
Bldg 6, 2nd Floor, Room W225
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) — CODE
NASA Goddard Space Flight Center
DCMA Boeing Space & Comm Seal Beach
El Segundo, California 90245

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)
Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE | FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
N/A — Amt: $0.00

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: Changes Clause 52.243-1

D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor is not, XXX is required to sign this document and return _4___ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

See page 2 through 23 for details

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)
Mr. Scott Ingersoll
Manager, NASA Contracts, BSS

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
Glenn Stewart

15B. CONTRACTOR/OFFEROR — (Signature of person authorized to sign)

15C. DATE SIGNED: MARCH 4, 2005

16B. UNITED STATES OF AMERICA — BY (Signature of Contracting Officer)

16C. DATE SIGNED: 3/7/05

Horse Trade 24 Additions, Deletions, and Amendments

1. Make the following changes to: Attachment B – Performance Specification (S-415-22)

a. In Accordance With CCR 6336A, Amend Paragraph 8.0 -Verification Test Program, Subparagraph 8.4 – Electromagnetic Compatibility Requirements, Subparagraph 8.4.1 General Requirements, Item 3 As Follows:

From:

8.4.1 General Requirements, Item 3:

The EMC test program is meant to uncover workmanship defects and unit-to-unit variations in electromagnetic characteristics, as well as design flaws. The spacecraft-level qualification and spacecraft-level flight acceptance EMC programs are the same. The component-level qualification EMC test program shall comply with the requirements of section 8.4. The component-level flight acceptance EMC test program shall uncover workmanship defects. The component-level acceptance EMC test program for the IPC components shall consist of CE and RE and for the RF components shall consist of RF susceptibility and RF leakage tests as defined below. (Mod 24, CCR 6009)

To:

8.4.1 General Requirements, Item 3:

The EMC test program is meant to uncover workmanship defects and unit-to-unit variations in electromagnetic characteristics, as well as design flaws. The spacecraft-level qualification and spacecraft-level flight acceptance EMC programs are the same **except where explicitly noted in the following sections.** The component-level qualification EMC test program shall comply with the requirements of section 8.4. The component-level flight acceptance EMC test program shall uncover workmanship defects. The component-level acceptance EMC test program for the IPC components shall consist of CE and RE and for the RF components shall consist of RF susceptibility and RF leakage tests as defined below. (Mod 24, CCR 6009; **Mod102, CCR6336A)**

b. **In Accordance With CCR 6336A**, Amend Paragraph 8.0-Verification Test Program, Subparagraph 8.4 – Electromagnetic Compatibility Requirements, Subparagraph 8.4.5 – Conducted Emissions Requirements, Subparagraph 8.4.5.1 – Narrowband Conducted Emissions As Follows:

From:

8.4.5.1 Narrowband Conducted Emissions

The narrowband conducted emissions on the instrument (42V) power and power-return leads shall be limited to the levels specified in Figure 8.4.5.1. Testing shall be in accordance with MIL-STD-461C and 462, test numbers CE01 and CE03, with limits as shown in Figure 8.4.5.1.

To:

8.4.5.1 Narrowband Conducted Emissions

The narrowband conducted emissions on the instrument (42V) power and power-return leads shall be limited to the levels specified in Figure 8.4.5.1. **Protoflight** testing **on the GOES N spacecraft** shall be in accordance with MIL-STD-461C and 462, test numbers CE01 and CE03, with limits as shown in Figure 8.4.5.1. **(CCR 6336R, Mod 102)**

c. **In Accordance With CCR 6336A**, Amend Paragraph 8.0-Verification Test Program, Subparagraph 8.4 – Electromagnetic Compatibility Requirements, Subparagraph 8.4.5 – Conducted Emissions Requirements, Subparagraph 8.4.5.2 – Broadband Conducted Emissions As Follows:

From:

8.4.5.2 Broadband Conducted Emissions

Broadband conducted emissions on the instrument (42V) power, and power-return leads shall be limited to the levels specified in Figure 8.4.5.2. Testing shall be in accordance with MIL-STD-461C and 462, test number CE03, with limits as shown in Figure 8.4.5.2.

To:

8.4.5.2 Broadband Conducted Emissions

Broadband conducted emissions on the instrument (42V) power, and power-return leads shall be limited to the levels specified in Figure 8.4.5.2. **Protoflight** testing **on the GOES N spacecraft** shall be in accordance with MIL-STD-461C and 462, test number CE03, with limits as shown in Figure 8.4.5.2. **(CCR 6336A, Mod 102)**

d **In Accordance With CCR 6336A**, Amend Paragraph 8.0-Verification Test Program, Subparagraph 8.4 – Electromagnetic Compatibility Requirements, Subparagraph 8.4.5 – Conducted Emissions Requirements, Subparagraph 8.4.5.3 – Common Mode Noise Conducted Emissions As Follows:

From:

8.4.5.3 Common Mode Noise Conducted Emissions

A conducted emissions test to control common mode noise (CMN) shall be required for the spacecraft. This frequency domain current test shall be performed on all non-passive components which receive or generate 42V instrument spacecraft primary power. The CMN limit requirements are described in Figure 8.4.5.3. The CMN test procedure is the same as the narrowband CE01/03 tests, except that the current probe is placed around both the plus and return primary wires together.

To:

8.4.5.3 Common Mode Noise Conducted Emissions

A **protoflight** conducted emissions test to control common mode noise (CMN) shall be required for the **GOES N** spacecraft. This frequency domain current test shall be performed on all non-passive components which receive or generate 42V instrument spacecraft primary power. The CMN limit requirements are described in Figure 8.4.5.3. The CMN test procedure is the same as the narrowband CE01/03 tests, except that the current probe is placed around both the plus and return primary wires together. **(CCR 6336A, Mod 102)**

e. **In Accordance With CCR 6336A**, Amend Paragraph 8.0-Verification Test Program, Subparagraph 8.4 – Electromagnetic Compatibility Requirements, Subparagraph 8.4.7 – Radiated Emissions Limits, Subparagraph 8.4.7.2 – Radiated Electric Fields, Subparagraph 8.4.7.2.2 – Radiated Broadband Electric Fields As Follows:

From:

8.4.7.2.2 Radiated Broadband Electric Fields

Unintentional radiated broadband electrical field levels produced by the spacecraft shall not exceed the levels specified in Figure 8.4.7.2.2. Testing shall be in accordance with MIL-STD-461C and 462, test number RE02, with the test frequency range and the limits revised as defined in Figure 8.4.7.2.2. This requirement applies to all continuous emissions. Transient or pulse type noise shall be considered on a case-by-case basis, but shall not in any way detrimentally affect the normal operation of the communications and telemetry and command subsystems, and instruments. Units inside the Faraday Cage may include the 40 dB of shielding effectiveness of the Faraday Cage in the test data review to the requirement of Figure 8.4.7.2.2. (Mod 40, CCR 6090)

To:

8.4.7.2.2 Radiated Broadband Electric Fields

Unintentional radiated broadband electrical field levels produced by the spacecraft shall not exceed the levels specified in Figure 8.4.7.2.2. **Prototype** testing **on the GOES N spacecraft** shall be in accordance with MIL-STD-461C and 462, test number RE02, with the test frequency range and the limits revised as defined in Figure 8.4.7.2.2. This requirement applies to all continuous emissions. Transient or pulse type noise shall be considered on a case-by-case basis, but shall not in any way detrimentally affect the normal operation of the communications and telemetry and command subsystems, and instruments. Units inside the Faraday Cage may include the 40 dB of shielding effectiveness of the Faraday Cage in the test data review to the requirement of Figure 8.4.7.2.2. (Mod 40, CCR 6090)**(CCR 6336A, Mod 102)**

f. **In Accordance With CCR 6344**, Add Subparagraph 10.5.5.5.1 To Paragraph 10 – Spacecraft Subsystems, Subparagraph 10.5 – Power And Electrical. Subparagraph 10.5.5 – Batteries, Subparagraph 10.5.5.5 – Test Requirements As Follows:

10.5.5.5.1 GOES N/O and P Battery Qualification Pack

Spacecraft Contractor shall assemble one flight like battery pack consisting of four GOES N/O cells and four GOES P cells as defined in SOW 3.3.6.1.

Prior to cell installation into the battery pack, the battery cells from the GOES N/O lot and the battery cells from the GOES P lot shall be acceptance tested in accordance with the GOES N-P cell acceptance test specification.

The battery qualification pack shall be tested as follows:

1. GOES N-P battery pack acceptance testing prior to battery pack environmental testing as defined in the GOES N-P flight battery pack acceptance test specification for 4.5 in. nickel-hydrogen battery pack.

2. GOES N-P battery pack vibration testing at protoflight levels as defined in the GOES N-P flight battery pack acceptance test specification for 4.5 in. nickel-hydrogen battery pack.

3. Eight protoflight thermal-vacuum cycles as defined in the GOES N-P flight battery back acceptance test specification for 4.5 in. nickel-hydrogen battery pack.

4. GOES N-P battery pack acceptance testing and post battery pack environmental testing as defined in the GOES N-P flight battery pack acceptance test specification for 4.5 in. nickel-hydrogen battery pack. **(CCR6344, Mod 102)**

2. Make the following changes to Attachment A, Statement of Work (S-415-23)

a. **In Accordance With CCR 6338**, Amend Paragraph 3.0 – Goes Spacecraft, Subparagraph 3.6 – Flight Operations, Subparagraph 3.6.2 – Pre-Launch Support, Subparagraph 3.6..2.1 – Network Compatibility Testing And Data Flows, Subparagraph 3.6.2.1.1 As Follows:

From:

3.6.2.1.1 GOES-N Three-spacecraft Compatibility

The spacecraft contractor shall supply all personnel, services and materials required to demonstrate at least six months prior to the launch of GOES-N that the GOES N-Q ground system can successfully operate the GOES-N spacecraft with no conflict for resources with the GOES I-M spacecraft.

To:

3.6.2.1.1 In-plant Compatibility Testing

Testing of the GOES-N spacecraft shall be conducted with a government-provided ground network (GN) compatibility test suite during spacecraft functional testing prior to spacecraft-level environmental testing. Testing with GOES-O,P,Q shall be required if changes are made to the telemetry and command systems of these spacecraft.

Testing of the GOES-O spacecraft shall be conducted with a government-provided ground network (GN) compatibility test suite (consisting of the DSN and the Universal Space Network (USN) test equipment) during spacecraft functional testing. The total test time (including spacecraft setup, test execution, and spacecraft de-configuration) shall not exceed 5 days (120 hours). The spacecraft contractor shall support the following activities:

a) **Update of the DSN spacecraft test configuration and creation of USN spacecraft test configuration procedure**
b) **Safety review of government-provided USN compatibility test procedure**
c) **Logistics/Facility support**
d) **Pre/Post Test Review support, including: Go/No-Go consent, consent to break review, action item closure and data review.**

The government shall, via task assignment, provide funding for the USN compatibility test development and logistics coordination support. The government shall, via task assignment, provide funding for government requested DSN compatibility test development changes. The government shall provide DSN and USN compatibility test procedures developed by JPL and the USN. The government shall provide any DSN or USN unique System Test Equipment. The government shall provide the JPL and the USN test personnel to develop and execute compatibility testing. The spacecraft contractor shall provide the spacecraft test support. The test shall not require modification to the existing spacecraft contractor test equipment. The USN compatibility test shall utilize the same test configuration (interfaces, facilities, STE (including cables) and spacecraft configuration) as the DSN Compatibility Test. The test shall be performed during a period when the Omni Antenna is normally de-mated. (CCR6338, Mod102)

b. In Accordance With CCR 6339B, Amend Paragraph 3.0 – GOES Spacecraft, Subparagraph – 3.4 – Integration & Test, Subparagraph 3.4.4 – Functional Tests, Subparagraph 3.4.4.2 – GOES N-Q Functional Tests With Flight Instruments, Item 2 As Follows:

From:

3.4.4.2 GOES N-Q Functional Tests with Flight Instruments

The spacecraft contractor shall set aside the schedule durations defined in Table 3.4.5.1 for instrument functional testing at the test phases indicated. The spacecraft contractor shall provide access to the spacecraft, spacecraft GSE, and personnel as required to support the testing. The spacecraft contractor shall support instrument Pre-Vibration Functional Testing by orienting the spacecraft such that the Imager and Sounder cooler cover door hinge axes and telescope optical axes are perpendicular to the ground. If the SXI is integrated on the solar array yoke when a first-motion and/or deployment test of the solar array is performed (during the Baseline Performance and/or the Launch Base Functional phase), the spacecraft contractor shall divide the test time allotted for the SXI in Table 3.4.5.1 such that there are at least two days of SXI test time both before and after the array test. Spacecraft testing may be conducted in parallel if it does not interfere with or compromise instrument testing.

In addition, the spacecraft contractor shall perform the following tests with the flight instruments for each of the GOES N-Q spacecraft.

1. A test with the spacecraft suspended with all mechanisms operating in an on-orbit mode to measure dynamic interactions between spacecraft and instrument components. The spacecraft contractor may substitute a similarly comprehensive test using the Imager, Sounder, and SXI instruments to verify dynamic interactions between the instruments and spacecraft mechanisms.
2. A test to measure the spacecraft magnetic dipole.
3. A test with all communications functions and instruments operating in an on-orbit mode to measure electromagnetic interactions between the spacecraft and instruments.
4. Calibration of all flight sensors (actual vs measured) and mechanisms (actual vs commanded).

The time for these tests are not included in the instrument schedule duration.

To:

3.4.4.2 GOES N-Q Functional Tests with Flight Instruments

The spacecraft contractor shall set aside the schedule durations defined in Table 3.4.5.1 for instrument functional testing at the test phases indicated. The spacecraft contractor shall provide access to the spacecraft, spacecraft GSE, and personnel as required to support the testing. The spacecraft contractor shall support instrument Pre-Vibration Functional Testing by orienting the spacecraft such that the Imager and Sounder cooler cover door hinge axes and telescope optical axes are perpendicular to the ground. If the SXI is integrated on the solar array yoke when a first-motion and/or deployment test of the solar array is performed (during the Baseline Performance and/or the Launch Base Functional phase), the spacecraft contractor shall divide the test time allotted for the SXI in Table 3.4.5.1 such that there are at least two days of SXI test time both before and after the array test. Spacecraft testing may be conducted in parallel if it does not interfere with or compromise instrument testing.

In addition, the spacecraft contractor shall perform the following tests with the flight instruments for each of the GOES N-Q spacecraft.

1. A test with the spacecraft suspended with all mechanisms operating in an on-orbit mode to measure dynamic interactions between spacecraft and instrument components. The spacecraft contractor may substitute a similarly comprehensive test using the Imager, Sounder, and SXI instruments to verify dynamic interactions between the instruments and spacecraft mechanisms.
2. A test to measure the spacecraft magnetic dipole **(GOES N and O only). (CCR6339B, Mod102)**
3. A test with all communications functions and instruments operating in an on-orbit mode to measure electromagnetic interactions between the spacecraft and instruments.
4. Calibration of all flight sensors (actual vs measured) and mechanisms (actual vs commanded).

The time for these tests are not included in the instrument schedule duration.

c. **In Accordance With CCR 6340A**, Amend Paragraph 3.0 – GOES Spacecraft, Subparagraph – 3.4 – Integration & Test, Subparagraph 3.4.4 – Functional Tests As Follows:

From:

3.4.4 Functional Tests

The spacecraft contractor shall provide all test facilities and all the resources necessary to define, prepare, perform, document, and analyze all functional and performance tests associated with GOES N-Q. The spacecraft contractor shall conduct functional testing as defined in S-415-22 section 8.0. In addition, launch vehicle adapter compatibility shall be verified by test on all spacecraft prior to shipment to the launch base. System testing is defined in section 3.6.2.3

All electrical interfaces shall be verified prior to any first time connection. Safe-to-mate procedures shall be implemented for all interfaces between any two of the following: spacecraft, GFE, EGSE, pyrotechnics, electrical explosive devices, SSGS, ATE, and any facility power. The EGSE shall be demonstrated to NASA to verify that it is adequate for the intended use. EGSE shall be under configuration control prior to the demonstration, and prior to use for spacecraft tests. The spacecraft contractor shall ensure that the instrument GSE is on, operational, and properly connected to the spacecraft GSE prior to any powered testing of an instrument.

The SXI GFE instrument shall be allotted 20 hours for safe-to-mate/electrical signal characterization activities as defined in the SXI/Spacecraft GSE ICD. Twenty (20) hours shall be allotted for the SXI Engineering Model and each and every SXI Flight Model. (CCR4174)

Government and GFE contractor support for activities involving GFE instruments is defined in Table 3.4.5.1. (CCR 6184B, MOD 59)

To:

3.4.4 Functional Tests

The spacecraft contractor shall provide all test facilities and all the resources necessary to define, prepare, perform, document, and analyze all functional and performance tests associated with GOES N-Q. The spacecraft contractor shall conduct functional testing as defined in S-415-22 section 8.0. In addition, launch vehicle adapter compatibility shall be verified by test on all spacecraft prior to shipment to the launch base. System testing is defined in section 3.6.2.3

For GOES N and GOES O all electrical interfaces shall be verified prior to any first time connection. Safe-to-mate procedures shall be implemented for all interfaces between any two of the following: spacecraft, GFE, EGSE, pyrotechnics, electrical explosive devices, SSGS, ATE, and any facility power. The EGSE shall be demonstrated to NASA to verify that it is adequate for the intended use. EGSE shall be under configuration control prior to the demonstration, and prior to use for spacecraft tests. The spacecraft contractor shall ensure that the instrument GSE is on, operational, and properly connected to the spacecraft GSE prior to any powered testing of an instrument.

For the GOES-P spacecraft and replacement spacecraft integration, all electrical interfaces between the GFE Imager and Sounder and the spacecraft shall be verified for Safe-to-mate. For the GOES-P spacecraft and replacement spacecraft, all electrical interfaces, between the spacecraft and the GFE SXI, and the interfaces between the SXI units, shall be verified for Safe-to-mate. Characterization of the electrical interfaces for the Imager, Sounder, and SXI shall not be required. Safe-to-mate procedures shall be implemented for all interfaces on the spacecraft between any two of the following: spacecraft, GFE, EGSE, pyrotechnics, electrical explosive devices, SSGS, Automated Test Equipment, and any facility power. The EGSE shall be demonstrated to NASA to verify that it is adequate for the intended use. EGSE shall be under configuration control prior to the demonstration, and prior to use for spacecraft tests. The spacecraft contractor shall ensure that the instrument GSE is on, operational, and properly connected to the spacecraft GSE prior to any powered testing of an instrument. (CCR6340A, Mod102)

The SXI GFE instrument shall be allotted 20 hours for safe-to-mate/electrical signal characterization activities as defined in the SXI/Spacecraft GSE ICD. Twenty (20) hours shall be allotted for the SXI Engineering Model and each and every SXI Flight Model. (CCR4174)

Government and GFE contractor support for activities involving GFE instruments is defined in Table 3.4.5.1. (CCR 6184B, MOD 59)

d. **In Accordance With CCR 6343A**, Amend Paragraph 3.0 – GOES Spacecraft, Subparagraph 3.3 – Subsystems Fabrication, Assembly And Test, Paragraph 3.3.6 – Power And Electrical. Subparagraph 3.3.6.1 – Battery Test Cells, Subparagraph 3.3.6.1.1 – GOES N/O/P Battery Qual Test Pack As Follows:

From:

3.3.6.1 Battery Test Cells

The spacecraft contractor shall deliver five activated battery cells from each activation lot, matched per spacecraft flight battery requirements, to NASA for performance testing. An activation lot is defined as a group of cells that receive electrolyte together via the same procedure. An activation lot can be the entire production lot or a subset of the production lot, depending on the quantity needed at the time of activation. For the GOES N, O, P spacecraft, the spacecraft contractor shall fabricate, test, and install a battery cell strain gauge assembly on each of the five cells from each activation lot, and ship the tested battery cells, with their installed strain gauge assemblies, to NASA. (CCR4345A, Mod96)

To:

3.3.6.1 Battery Test Cells

The spacecraft contractor shall deliver five activated battery cells from each activation lot, matched per spacecraft flight battery requirements, to NASA for performance testing. An activation lot is defined as a group of cells that receive electrolyte together via the same procedure. An activation lot can be the entire production lot or a subset of the production lot, depending on the quantity needed at the time of activation. **For the GOES N, O, P spacecraft, the spacecraft contractor shall fabricate, test, and install a battery cell strain gauge assembly on each of the five cells from each activation lot, and ship the tested battery cells, with their installed strain gauge assemblies, to NASA.** There shall be two activation lots for GOES P, but the government shall only receive five cells total. (CCR4345A, Mod96; **CCR6343A, Mod102)**

3.3.6.1.1 GOES N/O/P Battery Qualification Test Pack

The spacecraft contractor shall construct a qualification battery pack that shall house eight of the ten government battery cells defined in section 3.3.6.1. The battery pack shall be built using four of the cells selected from the GOES N/GOES O lot and four cells from the GOES P first activation lot, integrated into a spacecraft contractor provided battery chassis. At the conclusion of the spacecraft contractor performed qualification testing, the spacecraft contractor shall deliver the eight cells to the government. The remaining two battery cells (one from the GOES N/GOES O lot and one from the GOES P lot) shall be delivered to the government after cell acceptance testing of the N&O lot and the GOES P lot respectively. The cells from the GOES P lot shall have two activation dates. The first activation date shall be for the early activation of the four cells installed into the battery qualification pack. The second activation lot shall be for the GOES P flight lot and shall include the remaining government (one) cell. The fifth cell shall undergo DPA after cell acceptance testing of the GOES P lot. There shall be two activation lots for GOES P, but the government shall only receive five cells total. (CCR6343A; Mod 102)

3. Make the following changes to Attachment G, Contract Data Requirements List (CDRL), (S-415-26)

a. In Accordance With CCR 6339B Change CDRL, SDA 3.2.14-02 – Spacecraft Magnetic Control Plan For Magnetometer Performance Assurance, Item 5 – Data Requirements, Subparagraph E. As Follows:

From:

5. DATA REQUIREMENTS - Cont.

e. Measurements at the spacecraft contractor's facility of the residual dipole moment of each flight spacecraft. At the spacecraft contractor's discretion, the government will provide instrumentation, personnel, and data analysis to make this measurement and publish the test report, given a contractor

supplied, non-magnetic (<200 gauss cm^3) turntable capable of rotating the spacecraft about one principal axis in controlled 10 degrees increments.

To:

5. DATA REQUIREMENTS - Cont.

e. Measurements at the spacecraft contractor's facility of the residual dipole moment of **the GOES N and GOES O** spacecraft. At the spacecraft contractor's discretion, the government will provide instrumentation, personnel, and data analysis to make this measurement and publish the test report, given a contractor supplied, non-magnetic (<200 gauss cm^3) turntable capable of rotating the spacecraft about one principal axis in controlled 10 degrees increments. **(CCR6339B, Mod102)**

Horse Trade 25, Changes, Waivers, Additions and Deletions

Changes to Sounder ICD (DS80667-H00-011)

2. Make the following changes to Attachment D – GOES N-P Sounder ICD (DS80667-H00-011).

In accordance with CCR 4379, Change the Allowable Shock Levels for the Sounder As Follows:

Description Of The Change:

The SN 08 (GOES N) power supplies have experienced an exceedance wrt shock level allowables at the interface. The ICD allowable is 120Gs max while the max input at the interface was 120Gs (2X the allowable). The clamp band firing statistics provided by Boeing illustrated that the output can be as much as 405Gs. The maximum allowable at the interface will be set at 450Gs. The qual unit test is conducted with an additional 3dB margin (630Gs). This qualification testing is done to justify a modification to the ICD. However, this does not preclude the need for an RFW (Request for Waiver) from Boeing for the GOES N, O, and P spacecraft.

Reason for the Change

As a result of the GOES N clamp band firing the SN08 Imager and Sounder power supply ICD shock requirement was violated. The shock level at the interface was 2X the 120Gs ICD allowable. The potential maximum clampband firing shock levels recorded by Boeing is approximately 405Gs. Therefore, in order to qualify the flight power supplies, the unit level testing must be done at 3dB above what the new ICD level will be set at. Since the SN09 power supplies have been delivered and integrated to GOES-O and the SN10 power supplies

are to be integrated in April 2004, the only option is to test the SN11 power supplies to qual levels and to define the SN08, 09,and 10 units as qualified by similarity.

The following tables are to be amended as follows: Change Table 5.3.2-5 to Tables 5.3.2-5A and Table 5.3.2-5B in defined in CCR 4379, and amend Figures 5.3.2-8 to Figures 5.3.2-8A and Figure 5.3.2-8B as referenced in CCR 4379.

FROM:

Table 5.3.2-5 Maximum Allowable Sounder Shock Response Inputs from the Spacecraft (Maximum Input at Any One Mounting Foot[1])

Test Axis	Frequency, Hz	Sensor and Power Supply Modules Shock Response Levels, g
XYZ	200 400-1600 2000-4000	23 90 120

TO:

Table 5.3.2-5A Maximum Allowable Sounder Sensor Module Shock Response Inputs from the Spacecraft (Maximum Input at Any One Mounting Foot[1]) (CCR 4379A, Mod 102)

Test Axis	**Frequency, Hz**	**Sensor Module Shock Response Levels, g**
XYZ	**200** **400 to 1600** **2000 to 4000**	**23** **90** **120**

Table 5.3.2-5B Maximum Allowable Sounder Power Supply Module Shock Response Inputs from the Spacecraft (CCR4379A, Mod 102)

Test Axis	**Frequency, Hz**	**Power Supply Module Shock Response Levels, g**
XYZ	**200** **310 to 1000** **2000 to 4000**	**23** **90** **450**

b. In accordance with CCR 4379, Change Sounder ICD Figure 5.3.2-8; To Figure 5.3.2-8A And 5.3.2-8B As Follows:

FROM:

Figure 5.3.2-8 Allowable Sensor and Power Supply Module Shock Response Spectrum from the Spacecraft

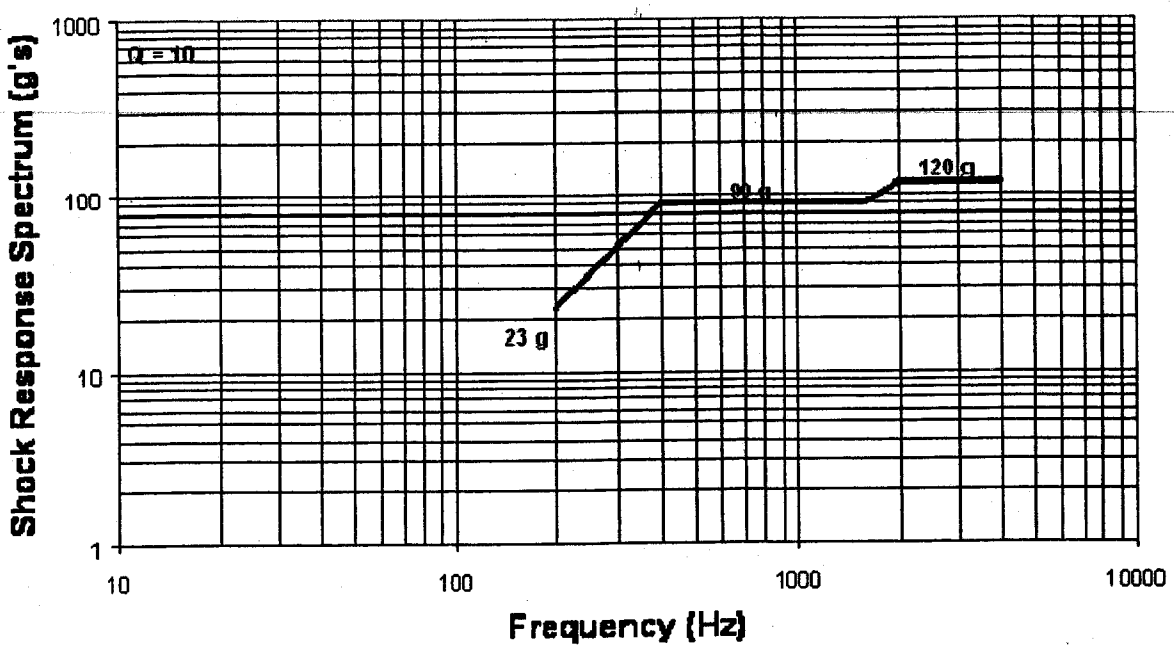

Figure 5.3.2-8 Allowable Sensor and Power Supply Module Shock Response Spectrum From the Spacecraft

TO: Figure 5.3.2-8A Maximum Allowable Sensor Module Shock Response Spectrum from the Spacecraft

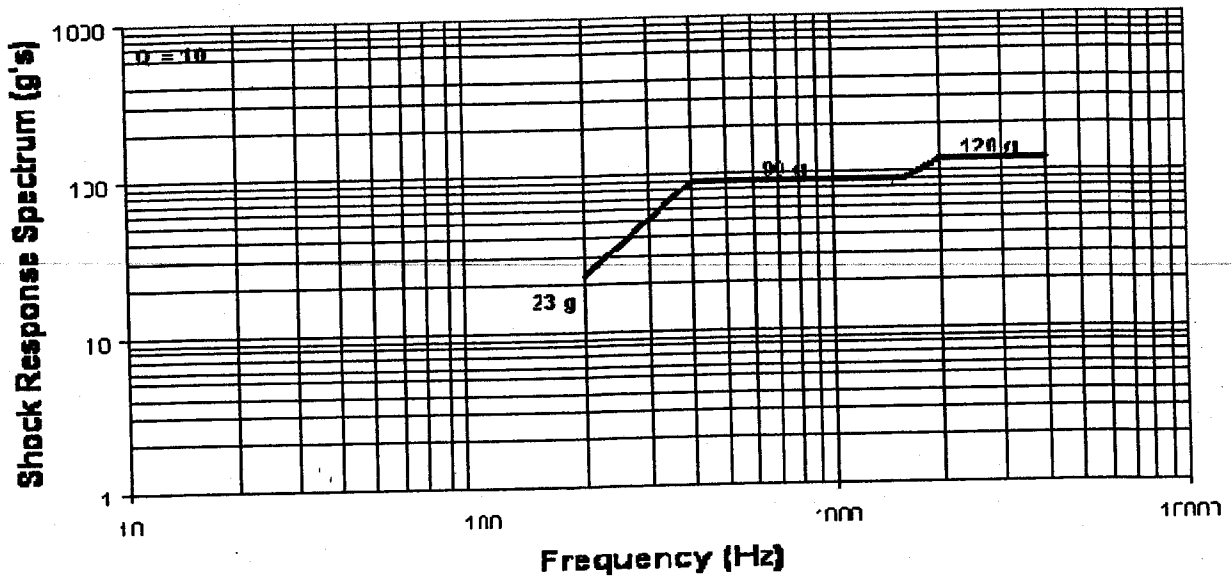

Figure 5.3.2-8B Maximum Allowable Power Supply Module Shock Response Spectrum from the Spacecraft

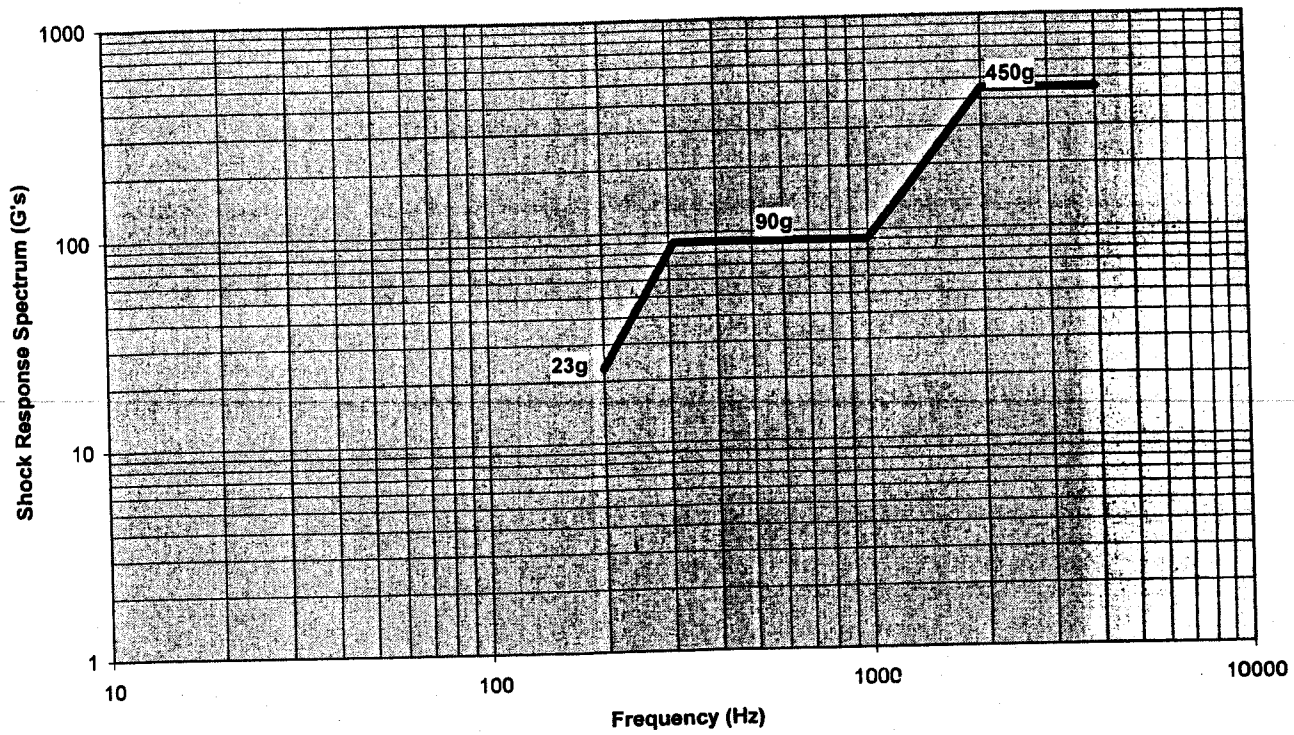

Figure 5.3.2-8B Maximum Allowable Power Supply Module Shock Response Spectrum from the Spacecraft

Changes to Imager ICD (DS80667-H00-010).

1. **Make The Following Changes To Attachment C – GOES N-P Imager ICD (DS80667-H00-010).**

<u>In accordance with CCR 4379</u>, Change The Allowable Shock Levels For The Imager As Follows:

Description of the Change:

The SN 08 (GOES N) power supplies have experienced an exceedance wrt shock level allowables at the interface. The ICD allowable is 120Gs max while the max input at the interface was 120Gs (2X the allowable). The clamp band firing statistics provided by Boeing illustrated that the output can be as much as 405Gs. The maximum allowable at the interface will be set at 450Gs. The qual unit test is conducted with an additional 3dB margin (630Gs). This qualification testing is done to justify a modification to the ICD. However, this does not preclude the need for an RFW (Request for Waiver) from Boeing for the GOES N, O, and P spacecraft.

Reason for the Change

Modification 102

As a result of the GOES N clamp band firing the SN08 Imager and Sounder power supply ICD shock requirement was violated. The shock level at the interface was 2X the 120Gs ICD allowable. The potential maximum clampband firing shock levels recorded by Boeing is approximately 405Gs. Therefore, in order to qualify the flight power supplies, the unit level testing must be done at 3dB above what the new ICD level will be set at. Since the SN09 power supplies have been delivered and integrated to GOES-O and the SN10 power supplies are to be integrated in April 2004, the only option is to test the SN11 power supplies to qual levels and to define the SN08, 09,and 10 units as qualified by similarity.

The following tables are to be amended as follows. Change Table 5.3.2-5 to Tables 5.3.2-5A and Table 5.3.2-5B in defined in CCR 4379, and amend Figures 5.3.2-8 to Figures 5.3.2-8A and Figure 5.3.2-8B as referenced in CCR 4379.

FROM:

Table 5.3.2-5 Maximum Allowable Imager Shock Response Inputs from the Spacecraft (Maximum Input at Any One Mounting Foot^2)

Test Axis	Frequency (Hz)	Sensor and Power Supply Modules Shock Response Levels (g)
XYZ	200 400 to1600 2000 to 4000	23 90 120

TO:

Table 5.3.2-5A Maximum Allowable Imager Sensor Module Shock Response Inputs from the Spacecraft (Maximum Input at Any One Mounting Foot^2) (CCR4379A, Mod 102)

Test Axis	Frequency (Hz)	Sensor Module Shock Response Levels (g)
XYZ	200 400 to 1600 2000 to 4000	23 90 120

Table 5.3.2-5B Maximum Allowable Imager Power Supply Shock Response Inputs from the Spacecraft (CCR 4379A, Mod 102)

Test Axis	Frequency (Hz)	Power Supply Module Shock Response Levels (g)
XYZ	200 310 to 1000 2000 to 4000	23 90 450

b. In accordance with CCR 4379A, Change Imager ICD Figure 5.3.2-8; to Figure 5.3.2-8A and 5.3.2-8B as follows:

FROM:

Figure 5.3.2-8 Maximum Allowable Sensor Module and Power Supply Module Shock Response Spectrum from the Spacecraft

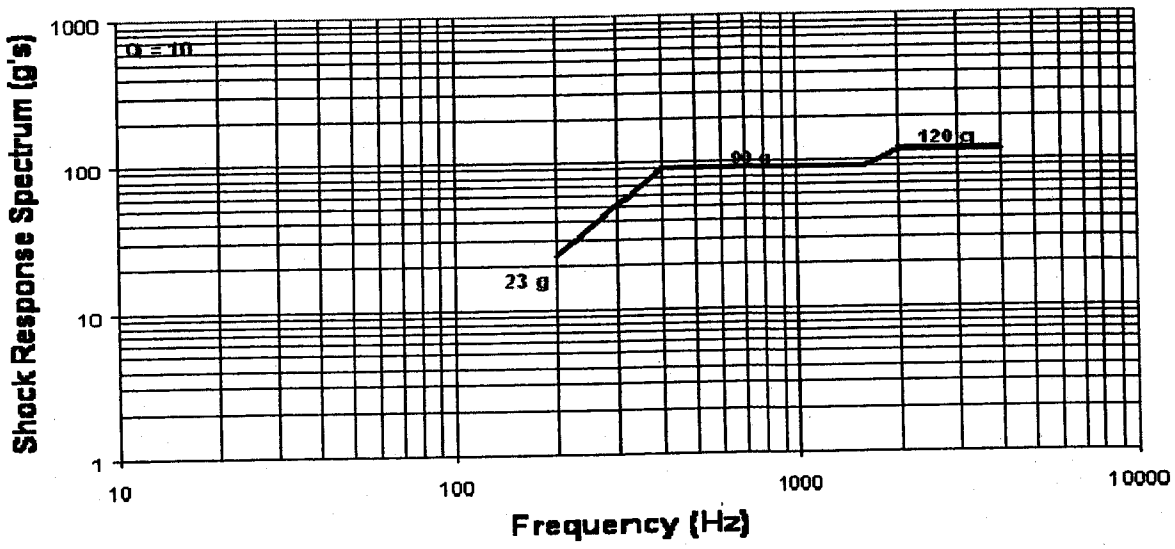

Figure 5.3.2-8 Allowable Sensor, Electronics and Power Supply Module Shock Response Spectrum from the Spacecraft

TO:

Figure 5.3.2-8A Maximum Allowable Sensor Module Shock Response Spectrum from the Spacecraft

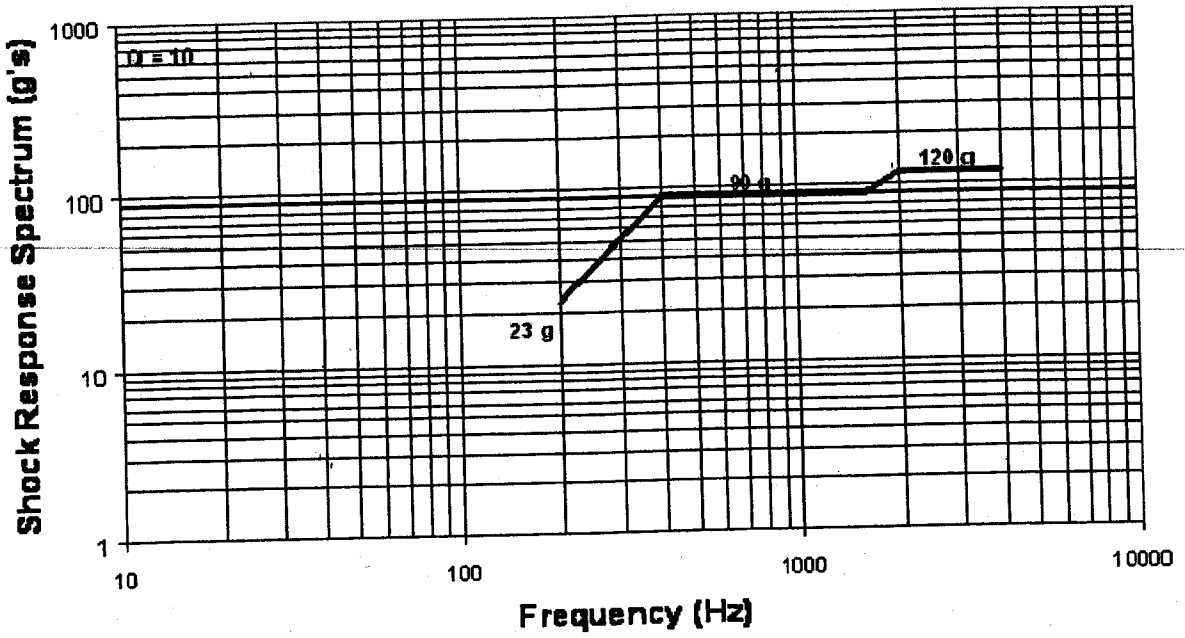

Figure 5.3.2-8A Maximum Allowable Sensor Module Shock Response Spectrum from the Spacecraft

TO: Figure 5.3.2-8B Maximum Allowable Power Supply Module Shock Response Spectrum from spacecraft

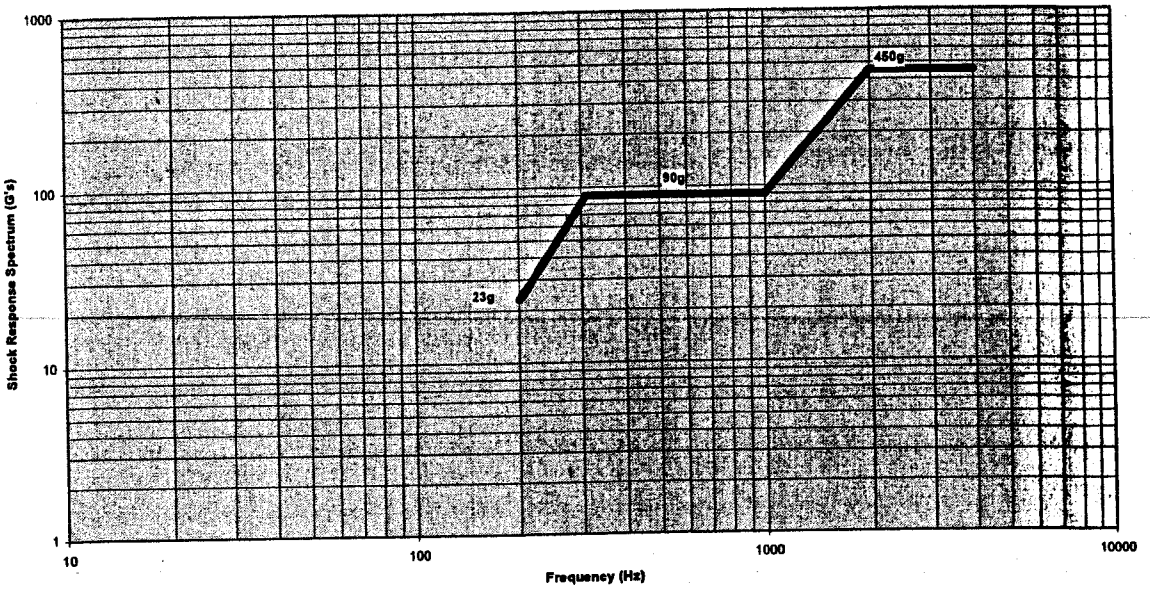

Figure 5.3.2-8B Maximum Allowable Power Supply Module Shock Response Spectrum from the Spacecraft

Waivers to Imager ICD (DS80667-H00-010)

3. **<u>In Accordance With CCR 6356/ W4481A:</u>** Make The Following Changes To Attachment C Of The Imager ICD As Follows:

Waiver 4481A: The sounder power supply exceeded its ICD requirements during spacecraft pyroshock test in TS80667-H00-007, (Reference Attached TA 220637). The ICD requirements are listed in Table 10.4.1 and Figure 10.4.1. The exceeded values are the following: Channel 509X is:146.8G's at 1781Hz; 234G's at 2000Hz; 170.9G's at 2245Hz; 133.9G's at 2519Hz. Channel 509Z is: 151.4G's at 1587Hz; 153.1G's at 1781Hz; 205.3G's at 2000Hz; 162.9G's at 2245Hz; 162.3G's at 2519Hz;145.3G's at 2828Hz;128.5G's at 3174Hz. Should be less than 120G's. ITT has performed a unit qualification test, based on the power supply qualification levels derived from the Boeing clamp band firing response levels. The unit as successfully gone through its qualification testing to these new levels.

Waiver 4481 waives the shock exceedance for the imager and sounder power supplies that were qualified by similarity via the SN11 instruments. Amend paragraph 5.3.2.4 of the waiver to the ICD Imager, document DS80667-H00-010.

Waivers to Sounder ICD (DS80667-H00-012)

4. **<u>In Accordance With CCR 6356A/ W4481A</u>**: Make The Following Changes To Attachment D Of The Sounder ICD As Follows:

W4481A: The sounder power supply exceeded its ICD requirements during spacecraft pyroshock test in TS80667-H00-007, (Reference Attached TA 220637). The ICD requirements are listed in Table 10.4.1 and Figure 10.4.1. The exceeded values are the following: Channel 509X is:146.8G's at 1781Hz; 234G's at 2000Hz; 170.9G's at 2245Hz; 133.9G's at 2519Hz. Channel 509Z is: 151.4G's at 1587Hz; 153.1G's at 1781Hz; 205.3G's at 2000Hz; 162.9G's at 2245Hz; 162.3G's at 2519Hz;145.3G's at 2828Hz;128.5G's at 3174Hz. Should be less than 120G's. ITT has performed a unit qualification test, based on the power supply qualification levels derived from the Boeing clamp band firing response levels. The unit as successfully gone through its qualification testing to these new levels.

W4481A waives the shock exceedance for the imager and sounder power supplies that were qualified by similarity via the SN11 instruments. Amend paragraph 5.3.2.4 of the waiver to the ICD Sounder, document DS80667-H00-012.

Horse Trade 26, Changes, Additions and Deletions

1. Make the following changes to Attachment B, Performance Specification (S-415-22)

a. In Accordance With CCR 4386A, Add Subparagraph 10.5.5.1.1 To Paragraph 10 – Spacecraft Subsystems, Subparagraph 10.5 – Power And Electrical, Subparagraph 10.5.5 – Batteries, Subparagraph 10.5.5.1 – General Requirements, As Follows:

10.5.5.1.1 Early Battery Integration (for GOES N Only)

For GOES N only, the flight battery may be integrated on the GOES N spacecraft prior to 90 days before the scheduled launch. The early integration of the GOES N flight battery shall be performed only if the following procedures are implemented and executed:

During Integration and Test activities that require the use of the battery:

1) Flight battery charging shall be performed to maintain each battery cell voltage greater than 1.27 V.

During Integration and Test and Pre-Ship activities in which the integrated flight battery is idle (not in use) for periods greater than 7 days:

1) The integrated flight battery shall be stored open-circuit and discharged to less than 0.2 V. The integrated flight battery shall be discharged using a cell let down procedure which brings each flight cell to less than 0.2 V.

2) Seven days after the initial flight battery discharge to less than 0.2 V, the battery cell voltages shall be re-verified to be less than 0.2V.

Following spacecraft completion (Gate 13), the integrated flight battery shall be stored open-circuit and discharged to less than 0.2V. After June 1, 2005, the flight battery shall be removed from the spacecraft and placed in cold storage, unless the spacecraft has been shipped to the launch site and launch processing has begun. After the flight battery has been

removed from the spacecraft and placed in cold storage, the spacecraft contractor shall perform a 10 deg C capacity test on the flight battery prior to reintegration to the spacecraft. (CCR4386A, Mod102)

2. Make the following changes to Attachment A, Statement of Work (S-415-23)

a. In accordance with CCR 4386A, Amend Paragraph 3.0 – GOES Spacecraft, subparagraph 3.6 – Flight Operations as follows:

From:

3.6 Flight Operations

The spacecraft contractor shall provide engineering, documentation, training, and personnel support to NASA/GOES Operations Manager (GOM) in the preparation and execution of GOES N-Q flight operations. NASA will make available all interfaces, including voice, data, and communications defined by the spacecraft contractor for pre-launch tests, orbit-raising operations, post-launch tests, and on-orbit operations requiring coordination between the government operations center and the DSN ground stations—Goldstone, Canberra, and Madrid. These interfaces shall be available for pre-launch testing no later than March 1, 2001.

The Government will provide the Deep Space Network (DSN) for the launch and orbit raising phase of GOES N, O, and P missions. The Government does not assume any liability for the DSN. The contractor shall provide all necessary spacecraft technical information and support requirements for input to a Project Service Level Agreement (PSLA) and a Detailed Mission Requirements (DMR) document. The final PSLA and DMR will be prepared by the Government. (CCR6094, Mod 40)

To:

3.6 Flight Operations

The spacecraft contractor shall provide engineering, documentation, training, and personnel support to NASA/GOES Operations Manager (GOM) in the preparation and execution of GOES N-Q flight operations. NASA will make available all interfaces, including voice, data, and communications defined by the spacecraft contractor for pre-launch tests, orbit-raising operations, post-launch tests, and on-orbit operations requiring coordination between the government operations center and **the Universal Space Network (USN) (USN is provided as determined necessary by the government) and** DSN ground stations—Goldstone, Canberra, and Madrid.

The Government will **provide the USN (USN is provided as determined necessary by the government) and** the Deep Space Network (DSN) for the launch and orbit raising phase of GOES N, O, and P missions. The Government does not assume any liability for the DSN **or USN.** The contractor shall provide all necessary spacecraft technical information and support requirements for input to a Project Service Level Agreement (PSLA) and a Detailed Mission Requirements (DMR) document. The final PSLA and DMR will be prepared by the Government. (CCR6094, Mod 40; CCR4386A, Mod102)

3. Make the Following Changes to Attachment H, Government Furnished Property.

a. In Accordance With Ccr 4386A, Add:

Test Execution System #2 Date Available: September 17, 2004

The following CCR's are added to this contract by reference:

4. The following CCR's are added to this contract by reference:

CCR 4386A	Flight operations and Early Battery Integration CCR
CCR 6356A/W4481A	Imager & Sounder Power Supply Spacecraft Pyroshock Test
CCR 4379A	Modification to Imager & Sounder Power Supply Shock Test
CCR 6340A	GFE Instrument Safe to Mate Test Reduction
CCR 6339A	Deletion of Static magnetic Dipole Test for GOES P
CCR 6336A	Deletion of Narrowband Conducted Emissions Current Measurement Req. on Post GOES-N S/C. Deletion of Broadband Conducted Emissions & Broadband Radiated Emissions Req)
CCR 6344	GOES N,O,& P Combined Battery Qualification Pack Test
CCR 6343A	Cell Allocation for Battery Qualification Pack Testing for GOES P
CCR 6338	DSN/USN on GOES O

5. Change Pages

Section J Pages J-1 through J-7

One (1) CD-ROM: Revised Statement of Work (S-415-23) Total Pages 1 through 87
Revised Performance Specification (S-415-22) Total Pages 1 through 153
Revised Contract data requirements List (CDRL's)
Attachment G

Revised Modification Change Page Summary

The fixed price of this contract and the funds allotted for the performance thereof, shall not be deemed to be increased by this modification. In consideration of the modifications, including, but not limited to, all waivers, deviations, and Government provided accommodations, agreed to herein as complete and equitable adjustments for all work required by this modification and Configuration Change Requests (CCR's) referenced herein, and as being technically equivalent under Clause H.15 of the contract. The contractor hereby releases the Government from any and all liability under this contract for further equitable adjustments attributed to such facts and circumstances giving rise to this modification and the CCR's referenced herein.

End of Modification 102

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF 3 PAGES

2. AMENDMENT/MODIFICATION NO.
103 One-hundred Three

3. EFFECTIVE DATE
See Blk 16

4. REQUISITION/PURCHASE REQ. NO.
N/A

5. PROJECT NO. (If applicable)
GOES N

6. ISSUED BY CODE
NASA/Goddard Space Flight Center
Bldg 6, 2nd Floor, Room W225
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE
NASA Goddard Space Flight Center
DCMA Boeing Space & Comm Seal Beach
El Segundo, California 90245

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)
Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO.
NAS5-98069

10B. DATED (SEE ITEM 13)
Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
N/A

Amt: $0.00

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: Changes Clause 52.243-1

D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor is not, XXX is required to sign this document and return _2___ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

See page 2 & 3 for details

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)
Mr. Scott Ingersoll
Manager, NASA Contracts, BSS

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
James H. Geiser Jr.

15B. CONTRACTOR/OFFEROR
Scott R. Ingersoll
(Signature of person authorized to sign)

15C. DATE SIGNED
12/1/04

16B. UNITED STATES OF AMERICA
BY
(Signature of Contracting Officer)

16C. DATE SIGNED
12/8/04

1. This modification is issued to increase the grace period for late deliveries for GOES N by Sixty-Three (63) days based on "Acts of God." The Terms and Conditions of this agreement are as follows:

The Government (NASA) and the Contractor (Boeing Satellite Systems) have agreed to:

- Keep the current requirements engineering handover date (EHD) for GOES N at December 31, 2004. (See Clause F.2 – Engineering Handover Date and Storage Dates)

- Increase the Engineering Handover Date GOES N grace period Sixty-Three (63) days (From 80 days to 143 days). The increase in the grace period is a result of the delays related to unusually severe weather. The grace period identified in Clause H.3, subparagraph (b), of the contract will extend the latest GOES N EHD to one-hundred forty three (143) days after the current F.2 engineering handover date, and, therefore, penalties would begin accruing for an EHD after May 23, 2005.

- A two party waiver of claims for delays that do not impact the EHD+143 date. This means that if either BSS or the NASA cause a delay but the EHD occurs before May 23, 2005, then there are no claims.

- Waive all additional storage costs related to the delays associated with the severe weather for the GOES N up to May 23, 2005. This waiver does not apply to GOES O & P.

2. Amend Clause H.3(b) – Pre-Determined Adjustment for Late Delivery, Page H-2 as follows:

From:

(b) If the engineering handover is otherwise delayed by the Contractor by more than 80 days from the EHD in the contract schedule, the contractor shall pay to the Government, for each calendar day of delay, beginning with the eighty- first day after the EHD in the contract schedule until the actual engineering handover date of said spacecraft, the sum of $50,000, up to a maximum of $12,000,000 for each spacecraft. The form of payment, whether a contract credit or otherwise, will be determined by the Contracting Officer.

To:

(b) If the engineering handover is otherwise delayed by the Contractor by more than 80 days **(143 days for GOES N ONLY)** from the EHD in the contract schedule, the contractor shall pay to the Government, for each calendar day of delay, beginning with

the eighty-first day **(144th day for GOES N ONLY)** after the EHD in the contract schedule until the actual engineering handover date of said spacecraft, the sum of $50,000, up to as maximum of $12,000,000 for each space craft. The form of payment, whether a contract credit or otherwise, will be determined by the Contracting Officer. (MOD 103)

3. The following Change Page is provided to Section H – Special Contract Requirements, page H-2 Attached)

Page H-2

The fixed price of this contract and the funds allotted for the performance thereof shall not be deemed to be increased by the modification. This modification also represents a complete and equitable settlement for the work associated with the change and releases the Government from any and all liability under this contract for further equitable adjustment attributed to such facts and circumstances giving rise by this modification

End of modification 103

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF 3 PAGES

AMENDMENT/MODIFICATION NO.: 104 One-hundred Four

3. EFFECTIVE DATE: See Blk 16

4. REQUISITION/PURCHASE REQ. NO.: N/A

5. PROJECT NO. (If applicable): GOES N

6. ISSUED BY — CODE

NASA/Goddard Space Flight Center
Bldg 6, 2nd Floor, Room W225
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) — CODE

NASA Goddard Space Flight Center
DCMA Boeing Space & Comm Seal Beach
El Segundo, California 90245

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)

Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE — FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

N/A — Amt: $0.00

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: Changes Clause 52.243-1

D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor is not, XXX is required to sign this document and return _2___ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

See page 2 & 3 for details

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)
Mr. Scott Ingersoll
Manager, NASA Contracts, BSS

15B. CONTRACTOR/OFFEROR
(Signature of person authorized to sign)

15C. DATE SIGNED 1/4/05

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
James H Geiser Jr

16B. UNITED STATES OF AMERICA
BY (Signature of Contracting Officer)

16C. DATE SIGNED 1/6/05

This modification is issued to add the Task assignments to the contract as follows:

Add Task Assignments:

	Hours	Dollars
TA 42 - Communication Subsystems Working Group Support	511.0	$83,089.00
TA 47 – Non-Flight Angular Displacement Sensor Use for Testing	299.0	49,207.00
TA 51 – TCP-IP Interface Between SSGS RPM and SPS	24.0	29,839.00
TA 75 – GRODAS MDL Data Monitoring	29.0	4,966.00
TA 81 – PMT Data Capture Implementation	77.0	14,694.00
TA 83 – GOES N ETER #3 Add. Test Time	396.0	70,298.00
TA 88 – SAR & LRIT Compatibility Test	390.0	68,065.00
TA 89 – Star Tracker Simulator	56.0	9,616.00
TA 91 – GTACS Server Operating System	53.0	133,810.00
TA 92 – SN09 Sounder Micro Phonics Testing	103.0	17,735.00
TA 93 – DEL Latest Version – Pure Simulation	32.0	5,561.00
TA 94 – Accelerometer Assembly on Star Tracker Bracket	80.0	16,060.00
TA 99 – Station Change Drift Simulation	165.0	29,481.00
TA 103 – Delta IV IV&IV LV Support	19.0	501,196.00
TA 104 – Sounder 09 Offset Verification	304.0	54,309.00
TA 105 – Magnetometer Boom Environmental Test	105.0	26,866.00
TA 107 – IPC Heat Pipe Testing	316.0	115,281.00
TA 108 – Delta IV IV&V LV Model Support	15.0	409,627.00
TA 109 – SXI Functional Testing Post Vibe	28.0	4,769.00
TA 116 – GOES O Patch Heater Wire Rework		0.00
TA 117 – Red Tag – Green Tag Processing	516.0	95,867.00
TA 119 - GOES O IPC Heat Pipe Testing	174.0	42,249.00
TA 123 – SXI Functional Testing Post Vibe	43.0	7,351.00
TA 124 – Safety Audit Support	190.0	32,771.00
TA 126 – GOES O PER Dry Run	94.0	16,806.00
TA 128 – Thermal Vacuum Fixture	103.0	18,409.00
TA 131 – GOES O Compatibility Testing	368.0	67,819.00
	4490	$1,925,741.00

1. Revise Clause B.1 Deliverable Requirements, Contract Line Item Number 0012 – Special Task Assignments with reports as follows:

From: $4,829,753.00 (Modification 94)
By: $1,925,741.00
To: $6,755,494.00 (Modification 104)

2. Increase The Price of Clause B.2, Firm Fixed Price as Follows:

From: $726,996,978.00
By: 1,925,741.00
To: $728,922,719.00

3. Clause C.2, Special Task Assignments and Reports, Revise item 1 – Level of Effort Required to Accomplish Work to include the following:

a. Correct the Administrative Error on Modification 94, The Remaining Direct Labor Hours, From: 244,236 to the correct total of 230,074 hours.

b. The contract price (To be added to Clause B.2) is hereby adjusted:

From: $4,829,753.00 By: $1,925,741.00 To: $6,755,494.00

The remaining direct labor hours as follows:

From: 230,074 By: -4490 To 225,584

4. Replace the contract areas listed below with the enclosed revised pages:

The contractor (Boeing Satellite Systems) hereby releases the Government from any and all liability under this contract for further adjustments attributed to such facts or circumstances giving rise by these task assignments.

END OF MODIFICATION 104

11a.	One set of GOES P Components as listed in Attachment M (formerly N/O Spares)	$49,500,000
11b	Additional Ground Support Special Test Equipment (Mod 73)	NSP
12.	Special Task Assignments with Reports	$ 6,755,494 See Clause B.9
13.	Additional Integration & Testing Support	$534,000 See Clause H.4
14.	Spacecraft Storage	See Clause H.4
OPTION 1 15.	On-Orbit Acceptance of GOES P Spacecraft	$136,447,938
16	RESERVED	
17	Additional Integration & Testing Support	See Clause H.4
18	Spacecraft Storage	See Clause H.4

Total value of each CLIN, for purposes of final payment shall be reduced by Performance Based Payments made to the contractor for that CLIN.

(End of clause)

B.2 FIRM FIXED PRICE (18-52.216-78) (DEC 1988)

The total firm fixed price for this contract is $728,922,719.00.

(End of clause)

B.3 RESERVED

SECTION C FOR NAS 5-98069
DESCRIPTION / SPECS/ WORK STATEMENTS
MODIFICATION 104

The price of CLIN 12 (included in Clause B.2) is hereby adjusted:

FROM: $4,829,753 **BY:** $1,925,741 **TO:** $6,755,494

The remaining direct labor hours are as follows:

FROM: 230,074 **BY:** -4490 **TO:** 225,584

2. Task Assignments and Reports

Task assignments will be issued unilaterally by the Contracting Officer to the Contractor designating the tasks to be performed, the schedule of performance, and any materials, travel, etc., known to be required. Such assignments will be issued on GSFC Form 18-45 "Task Assignment" or other appropriate form. Task assignments will be numbered consecutively. Task assignments may be modified by issuance of a subsequent form which cites the existing task assignment number followed by an alpha designation indicating the applicable revision sequence.

For each task assignment, the Contractor shall submit a one time Contractor Task Report. This report is the Contractor's resources plan for accomplishing the work described in each task assignment and shall be submitted within 10 calendar days, or a different time frame if acceptable by the Contracting Officer, after issuance of each task assignment. The Contractor shall commence work on the task assignment upon receiving written authorization from the Contracting Officer which will occur after an agreement of all costs is reached as described in the CTR.

The task report shall be the Contractor's overall estimate for the completion of the task assignment and shall include the following:

a. Date of task assignment;

b. Direct labor hours (including overtime), by month, price per hours;

c. Detailed travel and material estimates;

d. Price associated with subcontractors reflecting the above information;

e. A technical summary of the Contractor's understanding of the task; and

f. Any information found to be pertinent, such as interdivisional purchases, consultants, etc.

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF PAGES 16

2. AMENDMENT/MODIFICATION NO. 105

3. EFFECTIVE DATE See block 16C

4. REQUISITION/PURCHASE REQ. NO. n/a

5. PROJECT NO. (If applicable) GOES N

6. ISSUED BY CODE 210.Y
NASA/Goddard Space Flight Center
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE
NASA Goddard Space Flight Center
Code 210.7
Greenbelt, MD 20771

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)
Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
N/A

Amt: $0

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4)

A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: Clause H.15 No Cost Technical Trades

D. OTHER Specify type of modification and authority) Mutual Agreement

E. IMPORTANT: Contractor is not, XXX is required to sign this document and return _4___ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This supplemental agreement recognizes Horse Trade agreement No. 27.

Accordingly,

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)
Mr. Scott Ingersoll
Manager, NASA Contracts, BSS

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
Glenn Stewart

15B. CONTRACTOR/OFFEROR
(Signature of person authorized to sign)

15C. DATE SIGNED
January 19, 2006

16B. UNITED STATES OF AMERICA
BY
(Signature of Contracting Officer)

16C. DATE SIGNED
1/27/06

Horse Trade 27 Additions, Deletions, and Amendments

1. Make the following changes to: Attachment B – Performance Specification (S-415-22)

a. In Accordance With CCR 4331G, change the following paragraphs:

Change paragraph 7.1.8 item 2 from "...DRL 504-02 message format and philosophy"

To "...DRL 504-02 message with content and format that is consistent with the existing GOES I-M DRL 504-02 message format and philosophy."

Change paragraph 7.2.1 item 15 from "...in accordance with ISO GOES..."

To "...in accordance with ISI GOES..."

Re-number paragraph 9.5.2.1 to 9.5.2.1.1 and add "9.5.2.1 Envelope and Mass" (title only) immediately following 9.5.2

Change paragraph 10.2.3 from "This data stream shall then be balanced QPSK modulated".

To "This data shall be balanced QPSK modulated".

Update Table 10 as shown in the attached Table 10 (Attachment 1).

Table 10.2.1.8-1

Change "NRZ-M" in the WEFAX row, Channel Modulated Signal Structure column to "NRZ-L".

Table 12.10.2-1

Change "NRZ-M" in the WEFAX row, Channel Modulated Signal Structure column to "NRZ-L".

b. **In Accordance With CCR 4390**, paragraphs 4.1.2.1, 4.1.3.1.1, 4.1.4.1.1, 4.1.4.1.2, 4.1.4.1.3, 4.1.7 and 4.1.8 are changed to read as follows:

4.1.2.1 Imager Navigation
During a normal operational period a pixel shall be Earth located to within 65 μradians.

4.1.3.1.1 Visible and IR Channels
During a normal operational period, the WIFR shall be within 54 μradians.

4.1.4.1.1 Imager FFR - 15 Minute Separation Period

The FFR within a 15-minute period during a normal operational period shall be within 36 μradians.

4.1.4.1.2 Imager FFR - 90 Minute Separation Period
The FFR within a 90-minute period during a normal operational period shall be within 49 μradians.

4.1.4.1.3 Imager FFR - 24 Hour Separation Period
The FFR for corresponding pixels in images of the same selected Earth area taken during normal operational periods shall be within 114 μradians.

4.1.7 INR Budget Summary
For the purpose of developing the INR end-to-end system level error budgets, Table 4.1.7-1 contains the INR LOS budget allocations for the Imager; and Table 4.1.7-2 contains the INR LOS budget allocations for the Sounder. The GFE instrument (BOL) Measured/Analytic values in the tables shall be used in the determination of the system level errors. More detailed information is provided in ITT CDRL 4-12 for the GOES-NO/PQ Imager Instrument.

In addition to the random pointing errors (shown in the tables) introduced by the instruments in the determination of star and landmark locations, the associated 3σ ground determination of a star location (i.e., error with no other noise) shall be: ≤8 μradians E-W, and ≤14 μradians N-S. <u>For Imager visible landmarks the E-W and N-S 3σ PM ground system errors shall be ≤14μradians. For Imager IR landmarks the E-W and N-S 3σ PM ground system errors shall be ≤40.5 μradians.</u>
The Imager INR end-to-end system level error budgets shall include the error associated with using the PM to determine on-orbit performance (i.e. the INR Measured Performance). Specifically, the visible PM landmark error, the IR PM landmark error, and the residual coregistration error associated with the IR channel shall be included in the end-to-end system level error budgets along with the LOS performance values (i.e. all other system errors). For the development of the visible Imager INR end-to-end system level error budget, the visible PM landmark error shall be included using a root of the sum of the squares (RSS) approach. For the development of the IR Imager INR end-to-end system level error budget, the IR PM landmark error and the IR landmark coregistration residual error shall be included using a RSS approach except for the navigation error contribution where the coregistration residual error may be added. A square root of 2 multiplication factor may be applied to the visible PM landmark error, the IR PM landmark error, and the IR landmark coregistration residual error for the development of the Imager WIFR and FFR error contributions.

Table 4.1.7-1
INR LOS Budget Allocations - Imager (3σ in μradians)

Requirement	System Specification	GFE Instrument (BOL) Measured/Analytical E-W/N-S	GFE Instrument (BOL) Specification E-W/N-S
Navigation	65	33.5/23.1	±25/20
Within Frame Registration (Reg.)	54	39.9/37.3	±33/28
Frame-Frame Reg.			
15 minute	36	28.8/25.4	±28/28
90 minute	49	29.7/26.4	±28/28
24 hour	114	28.1/23.2	±28/28
48 hour	N/A	-	±28/28
Residual IR to Visible Coregistration Error	N/A	±19.3	N/A

The day-to-day variation in the instrument thermal profiles can be assumed as specified in Table 4.1.7-3 after compensation for repeatable instrument errors. A worst case set of instrument profiles are included in Figures 4.1.7-1 and 4.1.7-2, which are available in electronic form. These profiles are derived from ITT provided data, and modeling of the Imager deformations with the sun at 23° north latitude for the N-S deformation and 23° south latitude for the sun E-W deformation. The N-S curve results from combining the roll and roll misalignment, and the E-W curve from combining the pitch and pitch misalignment mispointings.

Table 4.1.7-3
Residual Day-to-Day Instrument Thermal Deformation Allocation - Imager (3σ in μradians)

Requirement	System Specification	GFE Instrument (BOL) Measured/Analytical E-W/N-S
Navigation	65	20.0/20.0
Within Frame Registration (Reg.)	54	4.0/4.0
Frame-Frame Reg.		
15 minute	36	2.0/2.0
90 minute	49	10.0/10.0
24 hour	114	10.0/10.0

4.1.8 On-Orbit INR Performance Determination

Table 4.1.8
Imager INR Measured Performance (3σ in μradians)

Channel	Navigation	Within Frame Registration	Frame-Frame Registration		
			15 minute	90 minute	24 hour
Visible (VIS)	66	57	41	53	115
Infrared (IR)	96	83	73	80	130

Waivers to Performance Specification (S-415-22)

2. Incorporate the following waivers to Attachment B – GOES N-P Performance Specification (S-415-22)

Description of the Waivers:

a. Waiver W4411B: As documented in CCR 6233B; waiver of requirement for channel out-of-band spurious emissions for GOES N of -62 dBC for both primary & redundant configurations of the DCPR service in-band spurious emissions.
b. Waiver W4412B: As documented in CCR 6234B; waiver of requirement for channel out-of-band spurious emissions for GOES N of -62 dBC for both primary & redundant configurations of the PDR service in-band spurious emissions.
c. Waiver W4413B: As documented in CCR 6235B; waiver of requirement for channel out-of-band spurious emissions for GOES N of -62 dBC for both primary & redundant configurations of the WEFAX service in-band spurious emissions.
d. Waiver W4414B: As documented in CCR 6236B; waiver of requirement for channel out-of-band spurious emissions for GOES N of -62 dBC for both primary & redundant configurations of the SD/MDL service in-band spurious emissions.
e. Waiver W4418: As documented in CCR 6262; waiver for out-of-band SAR NTIA/ITU spurious emissions for GOES N.
f. Waiver W4421B: As documented in CCR 6272B; waiver for out-of-band spurious emissions for GOES O.
g. Waiver W4422B: As documented in CCR 6287B; waiver of channel filter rejection points for SAR/DCPR processor SN003 and SN005 for GOES O.
h. Waiver W4419B: As documented in CCR 6295B; waiver of requirement for channel out-of-band spurious emissions for GOES N of -62 dBC for both primary & redundant configurations of the EMWIN service in-band spurious emissions.
i. Waiver W4420B: As documented in CCR 6296B; waiver of requirement for channel out-of-band spurious emissions for GOES N of -62 dBC for both primary & redundant configurations of the SAR service in-band spurious emissions.
j. Waiver W4405A: As documented in CCR 6302A; waive the requirement that EMI/EMC testing pf the RWA relevant to GOES not be done on a flight unit (GOES N, O, P).
k. Waiver W4406A: As documented in CCR 6303A: waive P-SPEC RE02 requirement @27 Mhz for the CTCU (GOES N).

l. Waiver W4416: As documented in CCR 6305; waiver of P-SPEC for the CDA and DSN 8th harmonic spurious requirements for GOES N.
m. Waiver W4417B: As documented in CCR 6306B; waiver of requirement for channel out-of-band spurious emissions for GOES N of -62 dBC for both primary & redundant configurations of the SD service in-band spurious emissions.
n. Waiver W4430B: As documented in CCR 6307B; waiver of the P-SPEC requirement which calls for the SAR service t have between 2.00 and 5.00dBc of carrier suppression in AGC mode at EOL, therefore BOL must measure between 2.03 and 4.95 dBc in AGC mode for GOES N and O.
o. Waiver W4442A: As documented in CCR 6319A; waive the proton contamination in the alpha channels requirement for the SN02 HEPAD to 1% (GOES P).
p. Waiver W4473: As documented in CCR 6349; waiver to the P-SPEC for the channel filter for the SAR channel, measured out of spec for GOES P.
q. Waiver W4475: As documented in CCR 6351; waiver from the P-SPEC CVCM requirement of <=0.1% (GOES N, O, P).
r. Waiver W4479: As documented in CCR 6355; waiver of the P-SPEC paragraph 3.7 fault tolerance requirements (GOES N, O, P).
s. Waiver W4485: As documented in CCR 6360; waiver to the P-SPEC for the solar array temperature sensor (GOES N, O, P).
t. Waiver W6902: As documented in CCR 6372; waive the P-SPEC requirement for the XRS/EUV to be within the minimum MAT temperature range, for the safehold mode and transfer orbit conditions as described in the CCR (GOES N).
u. Waiver W4498: As documented in CCR 6373; waive the P-SPEC requirement of 1000 hours of operating/power on time prior to launch for the EPs/HEPAD DPU (B) and the EPEAD West units (GOES N).
v. Waiver W6904A: As documented in CCR 6374A; waiver to the P-SPEC requirement that a solar spectrum at 2x10**6 K for the 2 X-ray channels for threshold sensitivity (GOES N, O, P).

3. Make the following changes to Clause B.8 <u>Criteria for Acceptance And Remedies For Nonconformance Before and After Acceptance</u> of the contract as follows:

<u>D Criteria for Acceptance of Non-Conforming Spacecraft</u>

2. The spacecraft contractor has demonstrated on-orbit Imager end-to-end INR measured performance in accordance with performance specifications, (excluding the enhancements to said specifications as set forth in clause H.21 sections 4.1.1.1.1, 4.1.1.4, 4.1.1.8, 4.1.2.1), except as specifically relaxed below. For the purposes of meeting this criterion only, there are no INR requirements for pixel/sounding between 65 degrees and 70 degrees Earth central angle, <u>no on-orbit Imager infrared end-to-end INR measured performance requirements,</u> nor are there any on-orbit Sounder end-to-end INR measured performance requirements. INR Measured Performance requirements shall be adjusted using the methodology in Section 4.1.7 in the event that the ground system errors are different from those specified in Section 4.1.7 and/or the instrument errors exceed those specified in Section 4.1.7. The adjustment shall be made by (1) removing the ground system errors and/or the instrument errors as specified in Section 4.1.7 to establish an INR line-of-sight (LOS) performance requirement and (2) recalculating the INR measured performance

requirements using the modified ground system errors and/or instrument errors using the methodology in Section 4.1.7.

a. During normal operations, the Imager INR shall meet the following visible performance requirements, where each value is in microradians:

Navigation (supercedes 4.1.8)	**Within Frame Registration (supercedes 4.1.8)**	**Frame-Frame Registration**		
		(supercedes 4.1.8) 15 minute	**(supercedes 4.1.8) 90 minute**	**(supercedes 4.1.8) 24 hr**
91	68	55	98	191

~~b. During normal operations, the Imager INR shall meet the following infrared performance requirements, where each value is in microradians:~~

~~**Navigation (supercedes 4.1.8)**~~	~~**Within Frame Registration (supercedes 4.1.8)**~~	~~**Frame-Frame Registration**~~		
		~~**(supercedes 4.1.8) 15 minute**~~	~~**(supercedes 4.1.8) 90 minute**~~	~~**(supercedes 4.1.8) 24 hr**~~
	~~75~~	~~52~~	~~96~~	~~190~~

4. **Replace pages B-25 and 26 of the contract with the attached (Attachment 2) pages [illegible] and 26. These replacement pages incorporate the changes documented in [illegible]ove.**

5. **Make the following changes to Clause H.21 Special Performance Requirements of the contract as follows:**

a. Under the second paragraph, second sentence add "Line-of-Sight (LOS)" after "Special".

b. Under the second paragraph, second sentence delete "are specified as Line of Sight (LOS)performance requirements and" after the word "clause"

c. Under the second paragraph, third sentence delete "Each Imager INR LOS performance requirement shall be" and replace with "The Imager end-to-end INR measured performance requirements specified in this clause are"

d. Under section 4.1.1.1.1 delete and replace with the following:

"The Imager LOS INR navigation specification shall be 73μrad for Earth central angles between 65 and 70 degrees. The Imager end-to-end INR measured performance

navigation specification shall be 74 μrad for visible landmarks and 103 μradians for IR landmarks for Earth central angles between 65 and 70 degrees,"

6. **Replace pages H-16 of the contract with the attached (Attachment 3) page H-16. This replacement page incorporates the changes documented in Item 5 above.**

7. **Make the following changes to Attachment A, Statement of Work (S-415-23)**

   a. **In Accordance With CCR 4331 Rev G,**

   Make the following corrections to paragraph 3.10.1.1 and 3.4.4.3.3.1:

   Change - "GOES-0" to "GOES – O"

   Change – from "**GOES-O Side 2 GOES-O Side 2**" to "**GOES-O Side 1 GOES-O Side 2**".

8. **Under the Contract on the face page of Attachment A (Statement of Work); Attachment B (Performance Specification); and Attachment G Contract Data Requirements List add the following statement:**

   "Per Contract Modification 105, all references to the Instrument of Opportunity (IOO) in this document no longer apply for the GOES N & O Missions"

9. **Make the following changes to Attachment G, Contract Data Requirements List as follows:**

   a. **In Accordance with CCR 4331 Ref G,**

   Make the following corrections to S-415-26 (CDRL):

   Change SE-2.4-01 item 5a as follows "...Performance Verification Matrices (PVM) which map performance and design requirements/parameters against the verification methods..."

   Change SE-2.4-02 item 5c as follows "Item moved to SE-2.4-01(n)."

Changes to Imager ICD (DS80667-H00-010).

10. **Make The Following Changes To Attachment C – GOES N-P Imager ICD (DS80667-H00-010).**

    Description of the Changes:

    a. As documented in CCR 6320 add a new DLRV to the Imager SSED which will indicate whether ACE instrument command processing in enabled.
    b. As documented in CCR 7104 revise the Imager interface control drawing to incorporate the Radiant Cooler Door Closed and Deployed Switch protective covers.

c. As documented in CCR 7107 incorporate SSED database inputs from ITT for Imager/Sounder SN09 into Appendix A3 for the Imager ICD.
d. As documented in CCR 7108 incorporate SSED database inputs from ITT for Imager/Sounder SN08 into Appendix A2 for the Imager ICD.

Waivers to Imager ICD (DS80667-H00-010)

11. Incorporate the following waivers to Attachment C of The Imager ICD

Description of Waivers:

a. Waiver W4453: As documented in CCR 6327; waiver to structural loads requirement for the imager optical port pyro firing deployment.
b. Waiver W4476: As documented in CCR 6352; waiver from exceeding the Imager ICD requirements for the GOES N imager power supply.
c. Waiver W4478: As documented in CCR 6354; waiver from exceeding the Imager ICD requirements for the GOES O imager power supply.
d. Waiver W4490: As documented in CCR 6363; waiver to the Imager ICD for the Imager Electronics (tested) during Pyroshock Clamp Band firing test requirement values of less than, equal to 2 – 3 G's at 100-125Hz.
e. Waiver W4491: As documented in CCR 6364; waiver to the Imager ICD for the Imager Electronics (tested) during Pyroshock Optical Port Cover Sounder first (OPC-S-1) firing test requirements values. The exceeded values are Channel 511X is 2.09G's at 100Hz, channel 511 Y is 2.13G's at 100Hz.
f. Waiver W4492: As documented in CCR 6365; waiver to the Imager ICD for the Imager Electronics (tested) during Pyroshock Mid Solar Array first and second (SA5-1 and-2) firing test requirement values. The exceeded values are Channel 511Z is 2.5G's at 112.3Hz and it should be less than/equal to 2.0G's at 112.3Hz.
g. Waiver as documented in CCR 7089; waiver of instrument responses to maximum allowable S/C sinusoidal disturbance in the X and Y axes.

Deviations to Imager ICD (DS80667-H00-010)

12. Incorporate the following deviations to Attachment C of The Imager ICD

Description of Deviations:

a. Deviation D4467A: As documented in CCR 6342A; deviation for GOES O & P system vibration response at any sensor mounting foot.
b. Deviation as documented in CCR 7091; deviation from ICD requirements for Imager SN 11 eest-west axis response limit for exposure of scan system to sinusoidal disturbance in the x-axis.

Changes to Sounder ICD (DS80667-H00-011)

13. Make the following changes to Attachment D – GOES N-P Sounder ICD (DS80667-H00-011).

Description of the Changes:

a. As documented in CCR 6320 add a new DLRV to the Sounder SSED which will indicate whether ACE instrument command processing in enabled.
b. As documented in CCR 7105 revise the Sounder interface control drawing to incorporate the Radiant Cooler Door Closed and Deployed Switch protective covers.
c. As documented in CCR 7107 incorporate SSED database inputs from ITT for Sounder SN09 into Appendix A3 for each Sounder ICD.
d. As documented in CCR 7108 incorporate SSED database inputs from ITT for Sounder SN08 into Appendix A2 for each Sounder ICD.

Waivers to Sounder ICD (DS80667-H00-012)

14. Incorporate the following waivers to Attachment D – GOES N-P Sounder ICD (DS80667-H00-011).

Description of Waivers:

a. Waiver W4452: As documented in CCR 6328; waiver to structural loads requirement for the sounder optical port pyro firing deployment.
b. Waiver W4476: As documented in CCR 6352; waiver from exceeding the Sounder ICD requirements for the GOES N sounder power supply.
c. Waiver W4478: As documented in CCR 6354; waiver from exceeding the Sounder ICD requirements for the GOES O sounder power supply.
d. Waiver W4490: As documented in CCR 6363; waiver to the Sounder ICD for the Sounder Electronics (assumed) during Pyroshock Clamp Band firing test requirement values of less than, equal to 2 – 3 G's at 100-125Hz.
e. Waiver W4491: As documented in CCR 6364; waiver to the Sounder ICD for the Sounder Electronics (assumed) during Pyroshock Optical Port Cover Sounder first (OPC-S-1) firing test requirements values. The exceeded values are Channel 511X is 2.09G's at 100Hz, channel 511 Y is 2.13G's at 100Hz.
f. Waiver W4492: As documented in CCR 6365; waiver to the Imager ICD for the Imager Electronics (tested) during Pyroshock Mid Solar Array first and second (SA5-1 and-2) firing test requirement values. The exceeded values are Channel 511Z is 2.5G's at 112.3Hz and it should be less than/equal to 2.0G's at 112.3Hz.

Deviations to Sounder ICD (DS80667-H00-012)

15. Incorporate the following deviations to Attachment D – GOES N-P Sounder ICD (DS80667-H00-011).

Description of Deviations:

a. Deviation D4467A; As documented in CCR 6342A; deviation for GOES O & P system vibration response at any sensor mounting foot.

Changes to SXI ICD (DS80667-H00-011)

16. Make the following changes to Attachment E – GOES N-P Solar X-Ray Imager (DS80667-H00-011).

Description of the Changes:

a. As documented in CCR 8060; revise the reference to the harness drawing in the ICD section 2.2.2 from 2A6603F to A06603G. Environmental Satellite (GOES), Rev E; ICD Drawings 2A06603.
b. As documented in CCR 8062; swap HEB 2A06416-101 21842-Lo4 with 2A06416-101 21842-L05.
c. As documented in CCR 8063; update the database inputs for SXI FM1, FM2 and FM Spare.

Waivers to SXI ICD (DS80667-H00-011)

17. Incorporate the following waivers to Attachment E – GOES N-P Solar X-Ray Imager ICD (DS80667-H00-011).

Description of Waivers:

a. Waiver W4451A: As documented in CCR 6329A; waiver to the SXI ICD shock requirements.
b. Waiver W4484: As documented in CCR 6358; waiver from the minimum allowable rise time requirement for envelope, clock and data pulse in the ICD.
c. Waiver W4493: As documented in CCR 6366; waiver to the SXI ICD for the SXI Telescope interface requirements during Pyroshock XPR Pinpuller 2 (west) second firing test requirement values. The exceeded values are Channel 402Z is 8.08G's at 100Hz and it should be less than/equal to 6.5G's at 100Hz.

Changes to EGSE ICD (DS80667-H00-014)

18. Make the following changes to Attachment O – GOES N-P Imager &Sounder Test Equipment ICD (DS80667-H00-014).

Description of the Changes:

a. As documented in CCR 7106; revise the target ICD drawing to relocate the Radiant Cooler Target to 2.00 +/- .25".

Waivers to EGSE ICD (DS80667-H00-014)

19. Incorporate the following waivers to Attachment O – GOES N-P Imager &Sounder Test Equipment (DS80667-H00-014).

Description of the Waivers:

a. Waiver W4461: As documented in CCR 6332; waiver for GOES N SCTV of the requirements to mount and install the Radiant Cooler Targets of 1.36 inches per the Imager/Sounder GSE ICD to 2.00.
b. Waiver as documented in CCR 7092A; waiver of coregistration requirements for SN 10 Sounder channels 7 and 19.
c. Waiver as documented in CCR 8061; changes to S-415-17 waiver for switching the SXI Flight Model 1 stand-off plate that has not gone through vibration testing.

20. The following CCR's are added to this contract by reference: CCR's 4331G, 4390, 4391, 6233B, 6234B, 6235B, 6236B, 6238, 6262, 6272B, 6287B, 6295B, 6296B, 6302A, 6303A, 6305, 6306B, 6307B, 6319A, 6320, 6327, 6328, 6329A, 6332, 6342A, 6349, 6350A, 6351, 6352, 6354, 6355, 6358, 6360, 6363, 6364, 6365, 6366, 6372, 6373, 6374A, 7089, 7091, 7092A, 7104, 7105, 7106, 7107, 7108, 8060, 8061, 8062 and 8063

The fixed price of this contract and the funds allotted for the performance thereof, shall not be deemed to be increased by this modification. In consideration of the modifications, including, but not limited to, all waivers, deviations, and Government provided accommodations, agreed to herein as complete and equitable adjustments for all work required by this modification and Configuration Change Requests (CCR's) referenced herein, and as being technically equivalent under Clause H.15 of the contract. The contractor hereby releases the Government from any and all liability under this contract for further equitable adjustments attributed to such facts and circumstances giving rise to this modification and the CCR's referenced herein.

End of Modification 105

Modification 105

NAS5-98069

Attachment 1

LINK	DSN & CDA Telemetry & Command DSN Station	CDA Telemetry & Command CDAS	SD Sensor Data Raw Imager & Sounder	PDR / GVAR Processed Data Relay	WE[illegible] Fa[illegible]	EMWIN Emergency Managers Info Network	MDL Multi-use Data Link (SXI, ADS Data)	DCPI Platform Interrogate	DC[illegible] Platform Report	[illegible] Search & Rescue
Spec§	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
Satellite Tx										
EIRP (Dbm)	Contractor Spec	Contractor Spec	Contractor Spec	Contractor Spec	Contractor Spec	Contractor Spec	Contractor Spec	Contractor Spec	46	45.0
Link Coverage	Omni	Omni	Earth	Earth	Earth	Earth	Earth	Earth	Earth	Earth
Freq (MHz)	2209.086	1694.000	1676.000	1685.700	1691.000	1692.700	1681.478	468.8125 Spare 468.8250 East 468.8375 West	1694.500 Domestic 1694.800 Int'l	1544.5
Polarization	RHC	RHC	Linear N-S	Linear N-S	Linear N-S	Linear N-S	Linear N-S	RHC	Linear N-S	RHC
Data Rate	1, 4 kbps	1, 4 kbps	2.62 Mbps Im 40kbps Sdr	2.11 Mbps	128/293 kbps info/raw	25 kbps	Contractor Spec	100 bps	100 bps BPSK, 1.5kHz per channel	400 bps
Data Format	Bi-phase-L	Bi-phase-L	NRZ-S				NRZ-L		BPSK Bi-Phase-L	
CDA&DSN Sub carrier (MHz)	1.024 BPSK	None							±60° BPSK ±5° 300/450 bps info/raw Coded 8 PSK, 1.5 kHz per channel, NRZ-L	
Carrier Modulation	Phase Mod	PSK	QPSK 4:1	BPSK ±3°	BPSK ±3°	BPSK ±3°	QPSK	±60° BPSK ±3°	1200/1800 bps info/raw Coded 8 PSK, 3.0 kHz per channel, NRZ-L	PM
Satellite Rx										
Link Coverage	Omni	Omni	N/A	Earth	Earth	Earth	N/A	Earth	Earth Below Noise to -100	Earth Below Nois to -125
Dyn Range (dBmi)	-115 to -50	N/A	N/A	-96 to -86	-107 to -97	-114 to -104	N/A	-114 to -104	- 18.7	Contractor Spec
Min Rx G/T (dB/K)	Contractor Spec	Contractor Spec	N/A	Contractor Spec	Contractor Spec	Contractor Spec	N/A	Contractor Spec		RHC
Polarization	RHC	RHC	N/A	Linear N-S	Linear N-S	Linear N-S	N/A	Linear N-S	RHC	406.050
Freq (MHz)	2034.200	2034.200	N/A	2027.700	2033.000	2034.700	N/A	2034.8875 Spare 2034.9000 East 2034.9125 West	401.900, Domestic 402.200, Int'l	406.025
Subcarrier (kHz)	16	16			128/293 kbps info/raw			100 bps		400 bps
Data Rate/Format	2kbps/NRZ-L	2 kbps/NRZ-L	N/A	2.11 Mbps/NRZ-S	NRZ-L	25 kbps/NRZ-L	N/A	±60° BPSK ±3°	See Satellite TX description, above	PM
Modulation	BPSK/Phase Mod	BPSK/Phase Mod	N/A	BPSK ± 3°	BPSK ± 3°	BPSK ± 3°	N/A			
Ground Tx										
Nom EIRP (dBm)	101.2 DSN	88.7 -91.7 CDA	N/A	95	83.7	76.7	N/A	76.7	45.0, 100 bps BPSK 48.0, 450 bps 8PSK 51.0, 1800 bps 8PSK	36.0
Storage/safehold	114	104.6								
Polarization	RHC DSN	Linear N-S	N/A	Linear N-S	Linear N-S	Linear N-S	N/A	Linear N-S	RHC	Linear N-
Ground Rx										
G/T (dB/K)	32.0 @ DSN 26.5 @ CDA	26.5 @ CDA	26.5 @ CDA	15.2 @ Users	-0.30 @ Users	-0.30 @ Users	15.5 @ SOCC 15.5 @ SEC	-21.6 @ Land -29 @ Buoys	12.0 @ Users	6.0 @ LU
Polarization	RHC DSN Linear CDA	Linear N-S	Linear N-S	Linear N-S	Linear N-S	Linear N-S	Linear N-S	RHC	Linear N-S	RHC
Rx System Loss (dB)	Contractor Spec	Contractor Spec	Actual Value not to exceed 2.3	2.3	2.3	2.3	Actual Value not to exceed 2.3*	2.0	2.0	2.0
End-to-End BER	10^{-5}	10^{-5}	10^{-8}	10^{-6}	10^{-8}	10^{-8}	10^{-8}	10^{-5}	10^{-6}	10^{-5}

Table 10.0. GOES N-Q On-Orbit RF System Link Parameter Requirement

*The contractor shall provide specifications (e.g. phase jitter) and suitable vendors for the government supplied portions of the MRS&S ground equipment

NAS5-98069

Attachment 2

SECTION B FOR NAS 5-98069
SUPPLIES AND SERVICES
MODIFICATION 105

1. The spacecraft has been placed in the proper orbit as specified in the Performance Specification. For each spacecraft launched on a Delta IV M (4,2) and without an IOO, there shall be sufficient on-orbit fuel to support 2 years of on-orbit storage and 8 years of operational life. For the purposes of this criterion, the measurement of on-orbit fuel shall be taken at Engineering Handover, and adjusted for any anomalous excessive usage for which the Contractor is responsible prior to acceptance. When the spacecraft has less than 10 years of on-orbit fuel, this criterion may be satisfied upon the Contractor paying the Government or crediting the contract , per Contracting Officer discretion, an amount in accordance with the following:

Fuel Life	Payment or Contract Credit (percentage of mission price)*
≥10 years	0%
9- 10 years	10%
8 – 9 years	20%
7 – 8 years	30%
6-7 years	40%
5-6 years	50%
0-5 years	100%

If there is an IOO on a spacecraft launch on a Delta IV M (4,2), the above requirements for fuel life and payment/credit shall be adjusted to account for the additional fuel use due to the presence of the IOO as mutually agreed to by the Government and the Contractor.

*for the purposes of this payment or contract credit, the mission prices are as follows:

N: CLIN 11
O: CLIN 11
P: the sum of CLIN 11a and 15

If the Government accepts the spacecraft with less than 10 years of on-orbit fuel life and the Contractor has made the payment or credit to the contract, such payment or credit shall be in lieu of any further payback under the payback tables in Section F for those service years for which a fuel-life payment/credit has been provided under this clause. Further, a fuel life payment/credit shall not be required if a total mission refund or replacement are required due to non-acceptance of the spacecraft.

2. The spacecraft contractor has demonstrated on-orbit Imager end-to-end INR measured performance in accordance with performance specifications, (excluding the enhancements to said specifications as set forth in clause H.21 sections 4.1.1.1.1, 4.1.1.4, 4.1.1.8, 4.1.2.1), except as specifically relaxed below. For the purposes of meeting this criterion only, there are no INR requirements for a pixel/sounding between 65 degrees and 70 degrees Earth central angle,no on-orbit imager infrared end-to-end INR measured performance requirements, nor are there any on-orbit Sounder end-to-end INR measured performance requirements. INR Measured Performance requirements shall be adjusted using

the methodology in Section 4.1.7 in the event that the ground system errors are different from those specified in Section 4.1.7 and/or the instrument errors exceed those specified in Section 4.1.7. The adjustment shall be made by (1) removing the ground system errors and/or the instrument errors as specified in Section 4.1.7 to establish an INR line-of-sight (LOS) performance requirement and (2) recalculating the INR measured performance requirements using the modified ground system errors and/or instrument errors using the methodology in Section 4.1.7.

a. During normal operations, the Imager INR shall meet the following visible performance requirements, where each value is in microradians:

Navigation (supercedes 4.1.8)	Within Frame Registration (supercedes 4.1.8)	Frame-Frame Registration (supercedes 4.1.8) 15 minute	(supercedes 4.1.8) 90 minute	(supercedes 4.1.8) 24 hour
91	68	55	98	191

3. The spacecraft to Imager interfaces allow the collection, downlink and retransmission of acceptable data products

4. The spacecraft to Sounder interfaces allow the collection, downlink and retransmission of acceptable data products.

5. Of the remaining spacecraft functions/services, no more than 3 are failed. If the functions/services do not meet the criteria set forth below, they will be deemed failed:
a. The spacecraft to SXI interfaces allow the collection and downlink of acceptable data products. Failure to provide SXI HASS Electronics Box thermistor data via the "Winchester connectors" will not constitute a failure of service for the purposes of this contract clause only
b. The spacecraft to IOO interfaces allow the collection and downlink of acceptable data products (when applicable)

c. Space Environment Monitoring (SEM) instruments shall meet performance specifications including any enhancements to said specifications as set forth in clause H.21. Failure to meet performance specification as a result of degradation of the EUV filters will not constitute a failure of service for the purposes of this contract clause only.

d. WEFAX shall meet performance specifications.

e. DCS shall meet performance specifications

f. EMWIN shall meet performance specifications

g. SAR shall meet performance specifications.

NAS5-98069

Attachment 3

If the Government elects to provide launch services to the contractor for any replacement of GOES N, O or P spacecraft, in accordance with Clause H.10 herein, the monthly ground storage rates for these spacecraft as specified in Clause H.4 herein shall be as follows:

GOES N	GOES O	GOES P
$75,000	$80,000	$85,000

(End of clause)

H.21 SPECIAL PERFORMANCE REQUIREMENTS

The following requirements supersede those stated in Attachment B, Performance Specification, dated August 26, 1997; Attachment C, GOES N-Q Imager Interface Control Document, dated August 14, 1997; and Attachment D, N-Q Sounder Interface Control Document, dated August 14, 1997. The format of this provision follows the numbering scheme of those documents.

Amendment 1 to RFP5-02520/427, dated August 26, 1997.
Amendment 2 to RFP5-02520/427, dated September 3, 1997.
Amendment 3 to RFP5-02520/427, dated September 5, 1997.
Amendment 4 to RFP5-02520/427, dated September 9, 1997.
Amendment 5 to RFP5-02520/427, dated December 4, 1997.

The Contractor shall provide all algorithms, SSGS procedures and operating strategies required to achieve the below Special Performance Requirements. The Image, Navigation, and Registration (INR) related Special Line-of-Sight (LOS) Performance Requirements provided in this clause do not include the ground system errors specified in Section 4.1.7 of the performance specification. The Imager end-to-end INR measured performance requirements specified in this clause are augmented with the Product Monitor (PM) ground system error and in the case of Infrared (IR) landmarks augmented with the residual co registration error associated with the IR channel to define the Imager INR Measured Performance requirement as described in Section 4.1.7. Each Sounder INR LOS performance requirement shall be augmented with the ground system error and the residual co registration error relative to the star channel to define the Sounder INR Measured Performance requirement, if a government provided ground measurement system is used that is similar to the PM for the Imager. The following special requirements added to the documents are as follows:

4.1.1.1.1 Selection of Fixed Grid Mode

The Imager LOS INR navigation specification shall be 73 μrad for Earth central angles between 65 and 70 degrees. The Imager end-to-end INR measured performance navigation specification shall be 74 μrad for visible landmarks and 103 μradians for IR landmarks for Earth central angles between 65 and 70 degrees.

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF PAGES 2

2. AMENDMENT/MODIFICATION NO. 106

3. EFFECTIVE DATE See Blk 16

4. REQUISITION/PURCHASE REQ. NO. N/A

5. PROJECT NO. (If applicable) GOES O

6. ISSUED BY CODE 210.Y
NASA/Goddard Space Flight Center
Bldg 6, Room W246
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE
NASA Goddard Space Flight Center
DCMA Boeing Space & Comm Seal Beach
El Segundo, California 90245

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)
Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
N/A Amt: $0.00

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

X D. OTHER Specify type of modification and authority)
Clause H.4--Additional Goverment. Accommodations

E. IMPORTANT: Contractor XXX is not, is required to sign this document and return ____copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

The purpose of this modification is to revise the Engineering Handover Date identified in clause F. 2 for the GOES O Spacecraft.

Accordingly:

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
Glenn Stewart

15B. CONTRACTOR/OFFEROR
(Signature of person authorized to sign)

15C. DATE SIGNED

16B. UNITED STATES OF AMERICA
BY
(Signature of Contracting Officer)

16C. DATE SIGNED 2/8/05

1. In accordance with Clause H.4—Additional Government Accommodations, paragraph (g) of contract NAS 5-98069, the Contractor (BSS) is hereby notified of a revision to the Engineering Handover Date (EHD) for the GOES O Spacecraft. This notification serves to fulfill the Government's contractual obligation to amend the contract via modification and to notify the contractor (BSS) of a revised EHD 15 months in advance of the current Engineering Handover Date.

As stated in Clause F.2 of contract NAS 5-98069, the Engineering Handover for the GOES O is hereby changed from June 30, 2006 to September 30, 2006.

2. Replace page F-3 with the enclosed revised F-3 change page.

The fixed Price of this contract and the funds allotted for the performance thereof shall not be deemed to be increased by the modification. This modification also represents a complete and equitable settlement for the work associated with this change and releases the Government from any and all liability under this contract for further equitable adjustment attributed to such facts and circumstances giving rise by this modification, except as provided for in Clause H.4(g).

End of Modification

F.2 ENGINEERING HANDOVER DATES AND STORAGE DATES

The following dates are defined as the engineering handover dates and the earliest dates at which the spacecraft may be placed into ground storage:

	Earliest Ground Storage Date	Engineering Handover Date
GOES N	January 1, 2002	December 31, 2004
GOES O	January 1, 2003	September 30, 2006
GOES P	January 1, 2005	April 30, 2007

The contractor shall place each GOES spacecraft or replacement spacecraft into storage, if required, at the contractor's facility immediately following successful completion of spacecraft Integration and Test (I&T) (including integration and test of the delivered GFE instruments) and successful completion of the pre-storage review, but no earlier than the dates specified for Earliest Storage Date (ESD). No storage charges, as defined in Clause H.4, shall be paid prior to the ESD or for any storage resulting from delays in the Contractor-provided launch.

(End of clause)

F.3 SECTION F CLAUSES INCORPORATED BY REFERENCE

(52.242-15) STOP-WORK ORDER (AUG 1989)
(52.247-34) F.O.B. DESTINATION (NOV 1991)

(End of By Reference Section)

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE	OF	PAGES
	1		3

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable)
107	3/21/05	4200106619	GOES N

6. ISSUED BY CODE 210.Y
NASA/Goddard Space Flight Center
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE
NASA Goddard Space Flight Center
DCMA Boeing Space & Comm Seal Beach
El Segundo, California 90245

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)
Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
N/A Amt: $0.0

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: Changes Clause 52.243-1 Alt. II

D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor is not, XXX is required to sign this document and return _4___copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This NTE $2,250,000 supplemental agreement authorizes work added to Attachment A, the Statement of Work, to change the Launch Site Tests to require a battery test for the GOES N spacecraft at the launch base.

Accordingly,

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
Mr. Scott Ingersoll Manager, NASA Contracts, BSS		Glenn Stewart	
15B. CONTRACTOR/OFFEROR (Signature of person authorized to sign)	15C. DATE SIGNED 3/31/05	16B. UNITED STATES OF AMERICA BY (Signature of Contracting Officer)	16C. DATE SIGNED 4/1/05

A. In Section B, Clause B.5 EVENTS FOR PERFORMANCE BASED PAYMENTS, add Event "N121 GOES N Battery Test at Launch Site," with amount "tbd", with date " L-1 month. "

B. Under Attachment A, the Statement of Work, revise WBS 3.4.6 to add the requirement for an additional battery test as follows:

FROM

3.4.6 Launch Site Tests

The spacecraft contractor shall prepare a launch site integration plan as defined in CDRL I&T-3.4.6-01.

TO:

3.4.6 Launch Site Tests

The spacecraft contractor shall prepare a launch site integration plan as defined in CDRL I&T-3.4.6-01. For GOES N only, the spacecraft contractor shall perform a battery functional test at the launch base. The battery test shall be performed with the batteries integrated on the spacecraft. The batteries shall be charged and discharged twice. The batteries shall, within one charge cycle and subject to thermal limitations, reach a minimum State of Charge (SOC) of 35%. After the first charge, the batteries shall be discharged and the process shall be repeated once. The spacecraft contractor shall develop a test plan and procedure with recommended success criteria.

C. Replace page 42 of the Statement of Work with the enclosed page 42.

D. CONTRACTOR'S STATEMENT OF RELEASE

A contract change is directed by the Government to perform the work added to this contract in the revised Attachment A, the Statement of Work, WBS 3.4.6 as documented herein. The Contractor agrees to begin promptly negotiating with the Contracting Officer the terms of the definitive contract amendment that will include mutually agreeable clauses, terms and conditions in addition to those required by the NASA FAR Supplement and law. The contract amendment for increased price or allotment of funds resulting from this change shall be asserted in accordance with the terms of the Changes clause of this contract and this modification. Until a mutually agreeable modification is made to the contract to codify this

directed change, the Contractor is not obligated to continue performance or incur costs beyond the point established in the contract clause entitled "Limitation of Funds." A not-to-exceed price of $2,250,000 is established by the Government for this effort. The Contractor hereby releases the Government from any and all liability for fee arising from estimated costs for this effort that exceed the not-to-exceed price of $2,250,000. Costs incurred by Contractor to perform this directed change shall be separately accounted for the duration of this effort.

End of Modification

CHANGE PAGE
FOR
CCR 4398
GOES-N BATTERY FUNCTIONAL TEST
STATEMENT OF WORK (SOW)
03/21/2005

Change S-415-23 (SOW) paragraph 3.4.6:

FROM

3.4.6 Launch Site Tests

The spacecraft contractor shall prepare a launch site integration plan as defined in CDRL I&T-3.4.6-01.

TO:

3.4.6 Launch Site Tests

The spacecraft contractor shall prepare a launch site integration plan as defined in CDRL I&T-3.4.6-01. For GOES N only, the spacecraft contractor shall perform a battery functional test at the launch base. The battery test shall be performed with the batteries integrated on the spacecraft. The batteries shall be charged and discharged twice. The batteries shall, within one charge cycle and subject to thermal limitations, reach a minimum State of Charge (SOC) of 35%. After the first charge, the batteries shall be discharged and the process shall be repeated once. The spacecraft contractor shall develop a test plan and procedure with recommended success criteria.

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF PAGES 2

2. AMENDMENT/MODIFICATION NO. 108

3. EFFECTIVE DATE See Blk 16

4. REQUISITION/PURCHASE REQ. NO. 4200110162

5. PROJECT NO. (If applicable) GOES N-P

6. ISSUED BY CODE 210.Y
NASA/Goddard Space Flight Center
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE
NASA Goddard Space Flight Center
DCMA Boeing Space & Comm Seal Beach
El Segundo, California 90245

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)
Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

See page 2 Amt:$0

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
52.232-18 – "Availability of Funds"

D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor X is not, is required to sign this document and return ____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

The purpose of the modification is to provide an additional $10,000,000 in funding.

Accordingly,

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
Glenn Stewart

15B. CONTRACTOR/OFFEROR
(Signature of person authorized to sign)

15C. DATE SIGNED

16B. UNITED STATES OF AMERICA
BY Glenn Stewart
(Signature of Contracting Officer)

16C. DATE SIGNED 5/16/05

1. Revise Clause H.6, Limitation of funds as Follows:

From:	$664,635,868	(Mod 100)
By:	10,000,000	
To:	$674,635,868	(Mod 108)

2. Revise Clause H.6, paragraph (c) (1) from April 30,2005 to August 2007

Accounting and Appropriation Data:

Purchase Requisition No. 4200110162

3. Replace page H-7 with the attached page H-7.

End of Modification

e. Subcontractor Reporting

FAR clause 52.219-9 and NASA FAR Supplement clause 18-52.219-75 require that the Contractor ensure that SF 294 and SF 295 reports are submitted by those subcontractors that have been required to adopt a Subcontracting Plan under the terms of the clause. These subcontractor reports must be submitted as required by paragraphs (c) and (d) above. The reports may be submitted through the Contractor or submitted directly. Regardless, the Contractor is responsible for ensuring proper and timely submittal of the required reports.

(End of clause)

H.6 LIMITATION OF FUNDS (FIXED-PRICE CONTRACT) (18-52.232-77) (MAR 1989)

(a) The sum of $674,635,868.00 (Mod 108) is presently available for payment and allotted to this contract. It is anticipated that from time to time additional funds will be allocated to the contract in accordance with the following schedule, until the total price of said item is allotted:

SCHEDULE FOR ALLOTMENT OF FUNDS

Date	Amounts
September 21, 2004	$38,000,000.00

(b) The Contractor agrees to perform or have performed work on the items specified in paragraph (a) above up to the point at which, if this contract is terminated pursuant to the Termination for Convenience of the Government clause of this contract, the total amount payable by the Government (including amounts payable for subcontracts and settlement costs) pursuant to paragraphs (f) and (g) of that clause would, in the exercise of reasonable judgment by the Contractor, approximate the total amount at the time allotted to the contract. The Contractor is not obligated to continue performance of the work beyond that point. The Government is not obligated in any event to pay or reimburse the Contractor more than the amount from time to time allotted to the contract, anything to the contrary in the Termination for Convenience of the Government clause notwithstanding.

(c)(1)It is contemplated that funds presently allotted to this contract will cover the work to be performed until August, 2007.

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF 2 PAGES

2. AMENDMENT/MODIFICATION NO. 109

3. EFFECTIVE DATE See Blk 16

4. REQUISITION/PURCHASE REQ. NO. N/A

5. PROJECT NO. (If applicable) GOES O

6. ISSUED BY CODE 210.Y

NASA/Goddard Space Flight Center
Bldg 6, Room W246
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE

NASA Goddard Space Flight Center
DCMA Boeing Space & Comm Seal Beach
El Segundo, California 90245

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)

Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

N/A Amt: $0.00

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

X D. OTHER Specify type of modification and authority) Clause H.4--Additional Goverment. Accommodations

E. IMPORTANT: Contractor XXX is not, is required to sign this document and return ____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

The purpose of this modification is to revise the Engineering Handover Date identified in clause F. 2 for the GOES O Spacecraft.

Accordingly:

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Glenn Stewart

15B. CONTRACTOR/OFFEROR

(Signature of person authorized to sign)

15C. DATE SIGNED

16B. UNITED STATES OF AMERICA BY

(Signature of Contracting Officer)

16C. DATE SIGNED 6/2/5

1. In accordance with Clause H.4—Additional Government Accommodations, paragraph (g) of contract NAS 5-98069, the Contractor (BSS) is hereby notified of a revision to the Engineering Handover Date (EHD) for the GOES O Spacecraft. This notification serves to fulfill the Government's contractual obligation to amend the contract via modification and to notify the contractor (BSS) of a revised EHD 15 months in advance of the current Engineering Handover Date.

As stated in Clause F.2 of contract NAS 5-98069, the Engineering Handover for the GOES O is hereby changed from September 30, 2006 to November 30, 2006.

2. Replace page F-3 with the enclosed revised F-3 change page.

The fixed Price of this contract and the funds allotted for the performance thereof shall not be deemed to be increased by the modification. This modification also represents a complete and equitable settlement for the work associated with this change and releases the Government from any and all liability under this contract for further equitable adjustment attributed to such facts and circumstances giving rise by this modification, except as provided for in Clause H.4(g).

End of Modification

F.2 ENGINEERING HANDOVER DATES AND STORAGE DATES

The following dates are defined as the engineering handover dates and the earliest dates at which the spacecraft may be placed into ground storage:

	Earliest Ground Storage Date	Engineering Handover Date
GOES N	January 1, 2002	December 31, 2004
GOES O	January 1, 2003	November 30, 2006
GOES P	January 1, 2005	April 30, 2007

The contractor shall place each GOES spacecraft or replacement spacecraft into storage, if required, at the contractor's facility immediately following successful completion of spacecraft Integration and Test (I&T) (including integration and test of the delivered GFE instruments) and successful completion of the pre-storage review, but no earlier than the dates specified for Earliest Storage Date (ESD). No storage charges, as defined in Clause H.4, shall be paid prior to the ESD or for any storage resulting from delays in the Contractor-provided launch.

(End of clause)

F.3 SECTION F CLAUSES INCORPORATED BY REFERENCE

(52.242-15) STOP-WORK ORDER (AUG 1989)
(52.247-34) F.O.B. DESTINATION (NOV 1991)

(End of By Reference Section)

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF 3 PAGES

2. AMENDMENT/MODIFICATION NO. 110

3. EFFECTIVE DATE 6/17/05

4. REQUISITION/PURCHASE REQ NO. 4200117833

5. PROJECT NO (If applicable) GOES N

6. ISSUED BY CODE 210.Y
NASA/Goddard Space Flight Center
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE
NASA Goddard Space Flight Center
DCMA Boeing Space & Comm Seal Beach
El Segundo, California 90245

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP Code)
Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(a) 9A. AMENDMENT OF SOLICITATION NO

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
N/A Amt: $0

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
X	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: Changes Clause 52.243-1 Alt. II
	D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor is not, XXX is required to sign this document and return _4___ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This un-priced supplemental agreement authorizes long lead efforts in support of revised specifications for the EUV instrument.

Accordingly,

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)
Mr. Scott Ingersoll
Manager NASA Contracts BSS

15A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
Glenn Stewart

15B. CONTRACTOR/OFFEROR
Scott Ingersoll
(Signature of person authorized to sign)

15C. DATE SIGNED
June 21, 2005

16B. UNITED STATES OF AMERICA
BY Glenn Stewart
(Signature of Contracting Officer)

16C. DATE SIGNED
6/27/05

A. Preliminary Design Review for the EUV Rework

The spacecraft contractor shall start the planning and preparations necessary to modify the (SN02 and SN03) Extreme Ultraviolet instruments. The planning and preparation shall define how the EUV E channel aperture may be corrected and how the C/D channels may be replaced with new A/B channels. The spacecraft contractor shall define how the A, B and E channels will be made compliant with the revised performance specification. The spacecraft contractor shall define the plans for the integration and test activities and the necessary procedure changes. In support of this effort the spacecraft contractor shall do the following

1. Prepare for and hold a Preliminary Design Review:
   a. Revised design requirements
   b. The characterization of the transmission gratings
   c. New A and B EUV detectors and performance requirements
   d. Revision of the schedule to include initial work with the engineering model (EM)
   e. EUV Design changes, Implementation and Test Plans
   f. Documentation Updates
   g. Operational changes
   h. Revision of the drawings
   i. Analysis of the A/B swap performance with respect to matched pairs and transmission gratings
   j. Timing and signal processing of the normal and inverted data channels.
2. Revise the EUV rework schedule to reflect the risk mitigation effort with the EM.
3. Following the PDR the spacecraft contractor shall begin preparations for the Critical design review (CDR) that will be held after completion of the above items.

B. EUV Detector Procurement and Grating Characterization

The spacecraft contractor shall start the planning and preparations necessary to modify the (SN02 and SN03) Extreme Ultraviolet instruments. This task is to begin the process as soon as possible by characterizing the transmission gratings and ordering new detectors for the EUV. In support of this effort the spacecraft contractor shall do the following

1. Characterize the transmission gratings to be used for the EUV rework.
2. Procure new A and B detectors and support technical meetings on the detector requirements definition.

CONTRACTOR'S STATEMENT OF RELEASE

Any claim for increased price or allotment of funds resulting from this change must be asserted in accordance with the terms of the Changes clause of this contract and this modification. Until modification is made, as a result of such assertion, the Contractor is not obligated to continue performance or incur costs beyond the point established in the contract clause entitled "Limitation of Funds." A not-to-exceed price of $437,077 is set for this effort. The contractor hereby releases the Government from any and all liability for fee arising from estimated costs for this effort that exceed $437,077. Costs of this changed effort shall be separately accounted for the duration of this effort.

End of Modification

*OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF 3 PAGES

2. AMENDMENT/MODIFICATION NO. 111

3. EFFECTIVE DATE 6/15/05

4. REQUISITION/PURCHASE REQ. NO. n/a

5. PROJECT NO. (If applicable) GOES N

6. ISSUED BY CODE 210.Y
NASA/Goddard Space Flight Center
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE
NASA Goddard Space Flight Center
DCMA Boeing Space & Comm Seal Beach
El Segundo, California 90245

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP Code)
Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
N/A Amt: $0

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.102(b).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: Changes Clause 52.243-1 Alt. II

D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor is not, XXX is required to sign this document and return _4___ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

The purpose of this supplemental agreement is to incorporate a waiver for the EUV instrument s/n 004 for the field of view.

Accordingly,

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)
Mr. Scott Ingersoll
Manager NASA Contracts BSS

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
Glenn Stewart

15B. CONTRACTOR/OFFEROR
(Signature of person authorized to sign)

15C. DATE SIGNED

16B. UNITED STATES OF AMERICA
BY
(Signature of Contracting Officer)

16C. DATE SIGNED 6/22/05

A. Revise Attachment B, the Performance Specification, to incorporate a waiver under paragraph 9.1.2.6 for the EUV instrument s/n oo4 for the field of view as follows:

9.1.2.6 Angular Response
The instrument response, including the combined effect of spacecraft pointing and sensor field-of-view (FOV), shall not deviate by more than 5%, with a goal of 2%, for point sources of constant flux within 20 arc-minutes of the solar disk center. Note: Refer to CCR6367, Mod111 (Deviation and Waiver (RDW) Summary) in Appendix A.

B. Replace page 87 of the Performance Specification with the enclosed page 87

C. Revise Attachment B, the Performance Specification, to incorporate a waiver under paragraph 9.1.2.1 for signal to noise ratio for the EUV instrument s/n oo4 as follows:

9.1.2.1 Wavelength Ranges and Threshold Sensitivities

Note: Refer to CCR6267C, Mod96; CCR6370, MOD111 (Deviation and Waiver (RDW) Summary) in Appendix A

Two X-ray channels are required to observe solar fluxes in the 0.05 to 0.3 nm and the 0.1 to 0.8 nm bands, respectively. At least five EUV channels are required to observe solar fluxes in the 10-125 nm range. The preferred and the acceptable range of values for the lower and upper XRS/EUV channel band edges are provided in Table 9.1.2.1.

The instrument shall be capable of measuring fluxes above a threshold sensitivity for each of the seven channels listed in Table 9.1.2.1. Threshold sensitivity is defined as the minimum in-band solar flux that will produce a mean signal equal to the standard deviation of the data (instrumental noise) over a 10-second interval. For the two X-ray channels, the in-band solar spectrum varies several orders of magnitude with wavelength as shown in Figure 9.1.2.1 (from Mewe and Groenschild, 1981, Astron. Astrophys. Suppl. Ser., vol. 45, pp 11-52). A solar spectrum at 2×10^6 K shall be assumed for the two X-ray channels for threshold sensitivity determination. For the EUV channels, the solar spectrum is not a strong function of wavelength and a flat spectrum may be assumed within each channel for determining the threshold sensitivity. The out-of-band rejection shall be such that < 10% of the observed signal comes from out-of-band for a typical solar spectrum. Alternatively, a method of measuring out-of-band contamination shall be provided. Over the duration of the mission, the instrument response shall not change by > 5% due to deposition of outgassed materials onto optical surfaces.

Table 9.1.2.1, Wavelength Ranges **(MOD 32, CCR 6057A)**

Channel	Preferred Wavelength Range (nm) Lower	Upper	Acceptable Lower Band Edge Range (nm)	Acceptable Upper Band Edge Range (nm)
XRS-A	0.05	0.4	0 to 0.1	0.3 to 0.5
XRS-B	0.1	0.8	0 to 0.2	0.75 to 1.2
EUV-A	10	25	5 to 12	15 to 27
EUV-B	25	40	17 to 27	34 to 43
EUV-C	40	65	37 to 52	62 to 70
EUV-D	65	100	10 to 85	20 to 110
EUV-E	119	124	114 to 120	123 to 129

D. Replace page 85 of the Performance Specification with the enclosed page 85.

The fixed price of this contract and the funds allotted for the performance thereof, shall not be deemed to be increased by this modification.

CONTRACTOR'S STATEMENT OF RELEASE

Inconsideration of this modification including the waiver agreed to herein as complete and equitable adjustment for all work required by this modification and configuration change requests (CCR) referenced herein the contractor hereby releases the Government from any and all liability under this contract for further equitable adjustments attributed to such facts and circumstances giving rise to this modification and the CCR referenced herein.

End of Modification

9.1.1.9 In-flight Magnetometer Effective Offset Determination

The effective magnetometer sensor offset (sensor plus spacecraft) shall be determined on-orbit via a spacecraft rotation maneuver. The determination shall be made during the spacecraft post-launch test period in the vicinity of local noon. **(MOD 36, CCR 6044B)**

9.1.2 Solar X-Ray and EUV Sensor

9.1.2.2 Wavelength Ranges and Threshold Sensitivities

Note: Refer to CCR6267C, Mod96; CCR6370, MOD111 (Deviation and Waiver (RDW) Summary) in Appendix A

Two X-ray channels are required to observe solar fluxes in the 0.05 to 0.3 nm and the 0.1 to 0.8 nm bands, respectively. At least five EUV channels are required to observe solar fluxes in the 10-125 nm range. The preferred and the acceptable range of values for the lower and upper XRS/EUV channel band edges are provided in Table 9.1.2.1.

The instrument shall be capable of measuring fluxes above a threshold sensitivity for each of the seven channels listed in Table 9.1.2.1. Threshold sensitivity is defined as the minimum in-band solar flux that will produce a mean signal equal to the standard deviation of the data (instrumental noise) over a 10-second interval. For the two X-ray channels, the in-band solar spectrum varies several orders of magnitude with wavelength as shown in Figure 9.1.2.1 (from Mewe and Groenschild, 1981, Astron. Astrophys. Suppl. Ser., vol. 45, pp 11-52). A solar spectrum at 2×10^6 K shall be assumed for the two X-ray channels for threshold sensitivity determination. For the EUV channels, the solar spectrum is not a strong function of wavelength and a flat spectrum may be assumed within each channel for determining the threshold sensitivity. The out-of-band rejection shall be such that < 10% of the observed signal comes from out-of-band for a typical solar spectrum. Alternatively, a method of measuring out-of-band contamination shall be provided. Over the duration of the mission, the instrument response shall not change by > 5% due to deposition of outgassed materials onto optical surfaces.

Table 9.1.2.1, Wavelength Ranges **(MOD 32, CCR 6057A)**

Channel	Preferred Wavelength Range (nm) Lower	Upper	Acceptable Lower Band Edge Range (nm)	Acceptable Upper Band Edge Range (nm)
XRS-A	0.05	0.4	0 to 0.1	0.3 to 0.5
XRS-B	0.1	0.8	0 to 0.2	0.75 to 1.2
EUV-A	10	25	5 to 12	15 to 27
EUV-B	25	40	17 to 27	34 to 43
EUV-C	40	65	37 to 52	62 to 70
EUV-D	65	100	10 to 85	20 to 110
EUV-E	119	124	114 to 120	123 to 129

9.1.2.3 Flux Resolution and Response

For the two X-ray channels, the resolution of the energy flux measurements shall be < 2% of the detected flux for fluxes > 20 times the threshold fluxes specified in Table 9.1.2.2. The telemetered data shall be a monotonic function of the input fluxes with deviations from a monotonic response function being less than the flux resolution when the incident flux exceeds 20 times the threshold flux. For the EUV channels the resolution of the energy flux measurement shall be < 0.25% of the full scale value.

Note: Refer to CCR6266C, Mod96 (Deviation and Waiver (RDW) Summary) in Appendix A

9.1.2.4 Electron Environment

The minimum performance of the Solar X-ray and EUV sensor shall not be compromised by the presence of the anticipated worst case natural electron environment. To allow for the fact that the trapped particle population is not isotropically distributed, a 2% peak-to-peak sinusoidal variation with angle shall be assumed superimposed on the average electron environment. The representation for the worst case natural environment assumes isotropic flux with the spectral distribution shown in Table 9.1.2.4.

Table 9.1.2.4
Assumed Worst-Case Electron Environment

E (MeV)	0.3	0.45	1.05	1.9
J(>E) (p cm^{-2} sec^{-1})	2×10^7	7×10^6	7×10^5	1.5×10^5

9.1.2.5 Temporal Resolution

The temporal resolution of the X-ray fluxes shall be at least 3 seconds and the flux values shall be transmitted to ground in real-time. The time delay between flux measurements in the two X-ray channels shall be less than 0.1 second. The instrument response to an instantaneous change in X-ray flux (a step function) shall be such that the telemetered output of each channel shall be within 10% of its final value within the specified temporal resolution. The analytical channel response function shall be specified by the spacecraft contractor to sufficient accuracy to allow for possible ground correction of the data. Each EUV channel shall be sampled at least every 30 seconds.

9.1.2.6 Angular Response

The instrument response, including the combined effect of spacecraft pointing and sensor field-of-view (FOV), shall not deviate by more than 5%, with a goal of 2%, for point sources of constant flux within 20 arc-minutes of the solar disk center. **Note: Refer to CCR6367, Mod111 (Deviation and Waiver (RDW) Summary) in Appendix A**

9.1.2.7 Pointing Knowledge

The spacecraft contractor shall provide a method of determining the XRS/EUV mechanical pointing with respect to the Sun-center. This pointing information shall be provided at the same cadence as the measurements made by the XRS/EUV, and shall be sufficient to determine unambiguously the direction to the Sun whenever the Sun center is within ±10° of the mechanical axis of the XRS/EUV FOV (i.e., multiple viewing angles should not give the same output signal). The accuracy of the XRS/EUV pointing determination with respect to the Sun-center shall be ±2 arcminutes with a resolution of ±1 arcmin when the Sun-center is within ±2° of the mechanical axis of the XRS/EUV FOV. This high accuracy and resolution is not required at viewing angles > 2°. The spacecraft contractor shall provide a calibration of the XRS/EUV FOV with respect to the mechanical axis used for the pointing determination.

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF PAGES 2

2. AMENDMENT/MODIFICATION NO. 112

3. EFFECTIVE DATE 6/29/05

4. REQUISITION/PURCHASE REQ. NO. 4200121185

5. PROJECT NO. (If applicable) GOES N

6. ISSUED BY CODE 210:Y

NASA/Goddard Space Flight Center
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE

NASA Goddard Space Flight Center
DCMA Boeing Space & Comm Seal Beach
El Segundo, California 90245

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)

Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

N/A Amt: $0

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: Changes Clause 52.243-1 Alt. II

D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor is not, XXX is required to sign this document and return _4___ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This un-priced supplemental agreement authorizes battery replacement risk mitigation efforts in support of the GOES N spacecraft. This direction is issued with the understanding that implementation of this direction will not result in a launch delay of GOES-N. At any time should implementation of this direction have the potential for causing a launch delay the contractor shall provide written notification to the Contracting Officer.

Accordingly, CCR: 4405 Rev. C

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)
Mr. Scott Ingersoll
Manager, NASA Contracts, BSS

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
Glenn Stewart

15B. CONTRACTOR/OFFEROR
Scott Ingersoll
(Signature of person authorized to sign)

15C. DATE SIGNED Sep 30, 2005

16B. UNITED STATES OF AMERICA
BY Glenn Stewart
(Signature of Contracting Officer)

16C. DATE SIGNED 10/3/05

A. Under Attachment A, the Statement of Work, add the following WBS for risk mitigation.

Add Section 3.12 and 3.12.1

3.12 GOES-N/O/P General Risk Mitigation Activities

The spacecraft contractor shall furnish the necessary personnel, facilities, services and materials to support pre or post launch risk mitigation activities as specified below.

3.12.1 Delta IV First Stage Batteries (GOES-N Only)

The spacecraft contractor shall replace the GOES-N Delta IV First Stage 40 AH batteries up to two times in an attempt to limit the Delta IV First Stage 40 AH batteries to a single charge cycle.

Accounting and Appropriation Data

PR: 4200121185 Amt: $0

CONTRACTOR'S STATEMENT OF RELEASE

Any claim for increased price or allotment of funds resulting from this change must be asserted in accordance with the terms of the Changes clause of this contract and this modification. Until modification is made, as a result of such assertion, the Contractor is not obligated to continue performance or incur costs beyond the point established in the contract clause entitled "Limitation of Funds." A not-to-exceed price of $184,000 is set for this effort. The contractor hereby releases the Government from any and all liability for fee arising from estimated costs for this effort that exceed $184,000. Costs of this changed effort shall be separately accounted for the duration of this effort.

End of Modification

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE	OF	PAGES
	1		2

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable)
113	See Blk 16	4200118513	GOES N-P

6. ISSUED BY CODE 210.Y
NASA/Goddard Space Flight Center
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE
NASA Goddard Space Flight Center
DCMA Boeing Space & Comm Seal Beach
El Segundo, California 90245

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)
Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
See page 2 Amt:$0

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
52.232-18 – "Availability of Funds"

D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor X is not, is required to sign this document and return ____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

The purpose of the modification is to provide an additional $15,000,000 in funding.

Accordingly,

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
		Glenn Stewart	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
(Signature of person authorized to sign)		BY (Signature of Contracting Officer)	7/26/05

1. Revise Clause H.6, Limitation of funds as Follows:

From:	$674,635,868	(Mod 108)
By:	15,000,000	
To:	$689,635,868	(Mod 113)

2. Revise Clause H.6, paragraph (c) (1) from August 2007 to January 2008

Accounting and Appropriation Data:

Purchase Requisition No. 4200118513

3. Replace page H-7 with the attached page H-7.

End of Modification

e. Subcontractor Reporting

FAR clause 52.219-9 and NASA FAR Supplement clause 18-52.219-75 require that the Contractor ensure that SF 294 and SF 295 reports are submitted by those subcontractors that have been required to adopt a Subcontracting Plan under the terms of the clause. These subcontractor reports must be submitted as required by paragraphs (c) and (d) above. The reports may be submitted through the Contractor or submitted directly. Regardless, the Contractor is responsible for ensuring proper and timely submittal of the required reports.

(End of clause)

H.6 LIMITATION OF FUNDS (FIXED-PRICE CONTRACT) (18-52.232-77) (MAR 1989)

(a) The sum of $689,635,868.00 (Mod 113) is presently available for payment and allotted to this contract. It is anticipated that from time to time additional funds will be allocated to the contract in accordance with the following schedule, until the total price of said item is allotted:

SCHEDULE FOR ALLOTMENT OF FUNDS

Date	Amounts
September 21, 2004	$38,000,000.00

(b) The Contractor agrees to perform or have performed work on the items specified in paragraph (a) above up to the point at which, if this contract is terminated pursuant to the Termination for Convenience of the Government clause of this contract, the total amount payable by the Government (including amounts payable for subcontracts and settlement costs) pursuant to paragraphs (f) and (g) of that clause would, in the exercise of reasonable judgment by the Contractor, approximate the total amount at the time allotted to the contract. The Contractor is not obligated to continue performance of the work beyond that point. The Government is not obligated in any event to pay or reimburse the Contractor more than the amount from time to time allotted to the contract, anything to the contrary in the Termination for Convenience of the Government clause notwithstanding.

(c)(1)It is contemplated that funds presently allotted to this contract will cover the work to be performed until January, 2008.

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF PAGES 2

2. AMENDMENT/MODIFICATION NO. 114

3. EFFECTIVE DATE See Blk 16

4. REQUISITION/PURCHASE REQ. NO. N/A

5. PROJECT NO. (If applicable) GOES O

6. ISSUED BY CODE 210.Y

NASA/Goddard Space Flight Center
Bldg 6, Room W246
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE

NASA Goddard Space Flight Center
DCMA Boeing Space & Comm Seal Beach
El Segundo, California 90245

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)

Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

N/A Amt: $0.00

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

X D. OTHER Specify type of modification and authority)
Clause H.4--Additional Goverment. Accommodations

E. IMPORTANT: Contractor **XXX** is not, is required to sign this document and return ____copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

The purpose of this modification is to revise the Engineering Handover Date identified in clause F. 2 for the GOES O Spacecraft.

Accordingly:

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
Glenn Stewart

15B. CONTRACTOR/OFFEROR

(Signature of person authorized to sign)

15C. DATE SIGNED

16B. UNITED STATES OF AMERICA
BY (Signature of Contracting Officer)

16C. DATE SIGNED 8/22/05

NSN 7540-01-152-8070
PREVIOUS EDITION UNUSABLE

30-105
Computer Generated

STANDARD FORM 30 (REV. 10-83)
Prescribed by GSA
FAR (48 CFR) 53.243

1. In accordance with Clause H.4—Additional Government Accommodations, paragraph (g) of contract NAS 5-98069, the Contractor (BSS) is hereby notified of a revision to the Engineering Handover Date (EHD) for the GOES O Spacecraft. This notification serves to fulfill the Government's contractual obligation to amend the contract via modification and to notify the contractor (BSS) of a revised EHD 15 months in advance of the current Engineering Handover Date.

As stated in Clause F.2 of contract NAS 5-98069, the Engineering Handover for the GOES O is hereby changed from November 30, 2006 to February 28, 2007.

2. Replace page F-3 with the enclosed revised F-3 change page.

The fixed Price of this contract and the funds allotted for the performance thereof shall not be deemed to be increased by the modification. This modification also represents a complete and equitable settlement for the work associated with this change and releases the Government from any and all liability under this contract for further equitable adjustment attributed to such facts and circumstances giving rise by this modification, except as provided for in Clause H.4(g).

End of Modification

F.2 ENGINEERING HANDOVER DATES AND STORAGE DATES

The following dates are defined as the engineering handover dates and the earliest dates at which the spacecraft may be placed into ground storage:

	Earliest Ground Storage Date	Engineering Handover Date
GOES N	January 1, 2002	December 31, 2004
GOES O	January 1, 2003	February 28, 2007
GOES P	January 1, 2005	April 30, 2007

The contractor shall place each GOES spacecraft or replacement spacecraft into storage, if required, at the contractor's facility immediately following successful completion of spacecraft Integration and Test (I&T) (including integration and test of the delivered GFE instruments) and successful completion of the pre-storage review, but no earlier than the dates specified for Earliest Storage Date (ESD). No storage charges, as defined in Clause H.4, shall be paid prior to the ESD or for any storage resulting from delays in the Contractor-provided launch.

(End of clause)

F.3 SECTION F CLAUSES INCORPORATED BY REFERENCE

(52.242-15) STOP-WORK ORDER (AUG 1989)
(52.247-34) F.O.B. DESTINATION (NOV 1991)

(End of By Reference Section)

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF PAGES 2

2. AMENDMENT/MODIFICATION NO. 116

3. EFFECTIVE DATE See Blk 16

4. REQUISITION/PURCHASE REQ. NO. 4200131163

5. PROJECT NO. (If applicable) GOES N-P

6. ISSUED BY CODE 210.Y

NASA/Goddard Space Flight Center
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE

NASA Goddard Space Flight Center
DCMA Boeing Space & Comm Seal Beach
El Segundo, California 90245

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)

Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

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12. ACCOUNTING AND APPROPRIATION DATA (If required)

See page 2 Amt:$0

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: 52.232-18 – "Availability of Funds"

D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor X is not, is required to sign this document and return ____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

The purpose of the modification is to provide an additional $5,000,000 in funding.

Accordingly,

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Glenn Stewart

15B. CONTRACTOR/OFFEROR

(Signature of person authorized to sign)

15C. DATE SIGNED

16B. UNITED STATES OF AMERICA

BY (Signature of Contracting Officer)

16C. DATE SIGNED 9/14/05

e. Subcontractor Reporting

FAR clause 52.219-9 and NASA FAR Supplement clause 18-52.219-75 require that the Contractor ensure that SF 294 and SF 295 reports are submitted by those subcontractors that have been required to adopt a Subcontracting Plan under the terms of the clause. These subcontractor reports must be submitted as required by paragraphs (c) and (d) above. The reports may be submitted through the Contractor or submitted directly. Regardless, the Contractor is responsible for ensuring proper and timely submittal of the required reports.

(End of clause)

H.6 LIMITATION OF FUNDS (FIXED-PRICE CONTRACT) (18-52.232-77) (MAR 1989)

(a) The sum of $694,635,868.00 (Mod 116) is presently available for payment and allotted to this contract. It is anticipated that from time to time additional funds will be allocated to the contract in accordance with the following schedule, until the total price of said item is allotted:

SCHEDULE FOR ALLOTMENT OF FUNDS

Date	Amounts
September 21, 2004	$38,000,000.00

(b) The Contractor agrees to perform or have performed work on the items specified in paragraph (a) above up to the point at which, if this contract is terminated pursuant to the Termination for Convenience of the Government clause of this contract, the total amount payable by the Government (including amounts payable for subcontracts and settlement costs) pursuant to paragraphs (f) and (g) of that clause would, in the exercise of reasonable judgment by the Contractor, approximate the total amount at the time allotted to the contract. The Contractor is not obligated to continue performance of the work beyond that point. The Government is not obligated in any event to pay or reimburse the Contractor more than the amount from time to time allotted to the contract, anything to the contrary in the Termination for Convenience of the Government clause notwithstanding.

(c)(1)It is contemplated that funds presently allotted to this contract will cover the work to be performed until March, 2008.

1. Revise Clause H.6, Limitation of funds as Follows:

From:	$689,635,868	(Mod 113)
By:	5,000,000	
To:	$694,635,868	(Mod 116)

2. Revise Clause H.6, paragraph (c) (1) from January 2008 to March 2008

Accounting and Appropriation Data:

Purchase Requisition No. 4200131163

3. Replace page H-7 with the attached page H-7.

End of Modification

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF PAGES 2

2. AMENDMENT/MODIFICATION NO. 117

3. EFFECTIVE DATE See Blk 16

4. REQUISITION/PURCHASE REQ. NO. N/A

5. PROJECT NO. (If applicable) GOES O

6. ISSUED BY CODE 210.Y
NASA/Goddard Space Flight Center
Bldg 6, Room W246
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE
NASA Goddard Space Flight Center
DCMA Boeing Space & Comm Seal Beach
El Segundo, California 90245

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)
Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
N/A Amt: $0.00

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

X D. OTHER Specify type of modification and authority)
Clause H.4--Additional Goverment. Accommodations

E. IMPORTANT: Contractor XXX is not, is required to sign this document and return ____copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

The purpose of this modification is to revise the Engineering Handover Date identified in clause F. 2 for the GOES P Spacecraft.

Accordingly:

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
Glenn Stewart

15B. CONTRACTOR/OFFEROR
(Signature of person authorized to sign)

15C. DATE SIGNED

16B. UNITED STATES OF AMERICA
BY (Signature of Contracting Officer)

16C. DATE SIGNED 9/26/05

NSN 7540-01-152-8070
PREVIOUS EDITION UNUSABLE

30-105
Computer Generated

STANDARD FORM 30 (REV. 10-83)
Prescribed by GSA
FAR (48 CFR) 53.243

1. In accordance with Clause H.4—Additional Government Accommodations, paragraph (g) of contract NAS 5-98069, the Contractor (BSS) is hereby notified of a revision to the Engineering Handover Date (EHD) for the GOES P Spacecraft. This notification serves to fulfill the Government's contractual obligation to amend the contract via modification and to notify the contractor (BSS) of a revised EHD 18 months in advance of the current Engineering Handover Date.

As stated in Clause F.2 of contract NAS 5-98069, the Engineering Handover for the GOES P is hereby changed from April 30, 2007 to October 30, 2007.

2. Replace page F-3 with the enclosed revised F-3 change page.

The fixed Price of this contract and the funds allotted for the performance thereof shall not be deemed to be increased by the modification. This modification also represents a complete and equitable settlement for the work associated with this change and releases the Government from any and all liability under this contract for further equitable adjustment attributed to such facts and circumstances giving rise by this modification, except as provided for in Clause H.4(g).

End of Modification

F.2 ENGINEERING HANDOVER DATES AND STORAGE DATES

The following dates are defined as the engineering handover dates and the earliest dates at which the spacecraft may be placed into ground storage:

	Earliest Ground Storage Date	Engineering Handover Date
GOES N	January 1, 2002	December 31, 2004
GOES O	January 1, 2003	February 28, 2007
GOES P	January 1, 2005	October 30, 2007

The contractor shall place each GOES spacecraft or replacement spacecraft into storage, if required, at the contractor's facility immediately following successful completion of spacecraft Integration and Test (I&T) (including integration and test of the delivered GFE instruments) and successful completion of the pre-storage review, but no earlier than the dates specified for Earliest Storage Date (ESD). No storage charges, as defined in Clause H.4, shall be paid prior to the ESD or for any storage resulting from delays in the Contractor-provided launch.

(End of clause)

F.3 SECTION F CLAUSES INCORPORATED BY REFERENCE

(52.242-15) STOP-WORK ORDER (AUG 1989)
(52.247-34) F.O.B. DESTINATION (NOV 1991)

(End of By Reference Section)

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF 20 PAGES

2. AMENDMENT/MODIFICATION NO. 118

3. EFFECTIVE DATE See block 16C

4. REQUISITION/PURCHASE REQ. NO. 4200117833

5. PROJECT NO. (If applicable) GOES N

6. ISSUED BY CODE 210.Y
NASA/Goddard Space Flight Center
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE
NASA Goddard Space Flight Center
Code 210.7
Greenbelt, MD 20771

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)
Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
N/A Amt: $0

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: Changes Clause 52.243-1 Alt. II

X D. OTHER Specify type of modification and authority) Mutual Agreement

E. IMPORTANT: Contractor is not, XXX is required to sign this document and return _4___ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This supplemental agreement recognizes agreements reached between the Government and the Contractor for redesign of the Extreme Ultraviolet instrument on GOES O and P and other considerations agreed to and identified herein.

Accordingly, CCR: 4403 Rev. D

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)
Mr. Scott Ingersoll
Manager, NASA Contracts, BSS

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
Glenn Stewart

15B. CONTRACTOR/OFFEROR
Scott Ingersoll
(Signature of person authorized to sign)

15C. DATE SIGNED March 14, 2006

16B. UNITED STATES OF AMERICA
BY
(Signature of Contracting Officer)

16C. DATE SIGNED 3/21/06

EUV Re-Design Agreement:

1.) The Government and Contractor do hereby enter into this Modification 118 to memorialize the agreement reached between the parties regarding the performance of GOES O and P EUV redesign and other consideration agreed to as identified herein, some of which pertains to GOES N.
2.) The parties agree to modify the EUV specifications consistent with CCR 4403D and that any future modifications regarding the EUV shall be in accordance with the terms set forth in 3a herein. Additionally, the parties agree to the following:

a.) The Contractor shall:

i) Expend no more than an additional $2,191,280 (based on 50% of Contractor's subcontractor ATC fee of $129,500), hereinafter referred to as the Contractor cap, toward correction on the GOES O and P EUV (This $2,191,280, based on 50% of Contractor's subcontractor ATC fee of $129,500, is in addition to the monies expended by the contractor on the GOES N EUV prior to Contract Mod 110). The Contractor Cap shall include costs incurred by the Contractor and one-half of Contractor's subcontractor's (ATC) fees on work authorized pursuant to this contractual modification and Contract Modifications 110 and 121 for spacecraft integration and test, updating system and mission documentation, for a single design change to be implemented on GOES O and P EUV instruments. The Contractor shall diligently track the costs incurred by it and its subcontractor and provide monthly, or sooner if necessary, written notification to the Government Contracting Officer of the costs accumulated and estimate at completion (EAC).

ii) Waive all rights to seek reimbursement for up to $2,000,000, which represents the initial monies expended by the Contractor for their efforts toward redesign of GOES O and P EUV instrument.

iii) Waive all rights to submit a request for equitable adjustment/claim for commercial impracticability of performance and/or impossibility of performance based on the EUV specification for GOES N, O, and P EUV instruments.

iv) Waive all rights to submit a request for equitable adjustment/claim for any and all expenses associated with the GOES N launch site battery test effort specified in Task Assignment 153 and Modification 107. Modification 107 is considered definitized at no additional cost or change to the contract price.

v) Waive all rights to submit a request for equitable adjustment/claim for all expenses incurred in pursuing prior

EUV design modifications, including the grazing incidence mirror EUV design option.

vi) Agree that receipt, at the Government operations center, of valid spacecraft telemetry through the de-interleaved data link is a Spacecraft Launch Commit Criteria requirement.

vii) Waive payment for costs and fees incurred in performance of Task Assignments 100, 106R3, 111R5, and 122R1.

vii) Waive all rights to submit a request for equitable adjustment/claim or invoice pursuant to Clause H.4(b) and (e) for the pre-priced daily costs associated with additional instrument accommodations and integration and test support provided for the GOES N and GOES O SXI CEB, DEB, and PEB rework. However, the 3.4 days associated with the GOES N PEB and DEB rework and the 7.4 days associated with the GOES O CEB, DEB, and PEB rework will be assessed as part of the allowable Clause H.4 grace period. The preparation-effort under Task Assignment 148, Task Assignment 150, and Task Assignment 152 will be priced and paid in accordance with the task assignment process.

viii) Waive all rights to submit a request for equitable adjustment/claim for all expenses associated with adding the requirement for payload fairing GN2 purge for GOES N authorized by Task Assignment 151. Contractor agrees to perform the same work on GOES O and GOES P as was performed on GOES N in accordance with changed performance specification 10.11.5 contained in this modification.

b.) The Government shall:

i.) Reimburse the Contractor in an amount not to exceed $2,400,000, hereinafter referred to as the Government Cap, for reasonable, allowable and allocable costs incurred by Contractor's subcontractor (ATC), including one-half of Contractor's subcontractor's (ATC) fees, for work performed to implement modified specifications for GOES O & P EUV design per Contract Modifications 110 and 121 and work authorized pursuant to this contract modification.

ii.) Agree to increase the allowable delay for late delivery on GOES N by sixty (60) days from the previous total of one hundred forty three days for a new total of two hundred three (203) days of allowable delay.

iii.) In addition to the reimbursement of the amounts described in Paragraph 2.b)i) above, reimburse the Contractor in an amount not to exceed $191,280 for costs incurred over $2,000,000 (which includes one half of Contractor's subcontractor's (ATC) fees) for reasonable, allowable, and allocable costs incurred by the Contractor, for work performed to implement modified

specifications for GOES O & P EUV design as specified herein. The Government will not reimburse the Contractor for the first $2,000,000 of the total of Contractor costs (an amount which includes one half of Contractor's subcontractor's (ATC's) fees).

iv.) Modify the specification for the GOES O & P EUV to document the performance achieved for both the GOES O & P EUV after the EAC exceeds either of the caps identified in this modification or the re-design effort has been completed, for less than the allocated cap amounts.

3. Procedural Rules:

a. The Contractor shall provide the Government with a written monthly, or earlier as needed, status of costs incurred and forecast of the EAC. This status report shall be submitted to the NASA contracting officer by the first day of each month, earlier as needed. In the event that the estimate at completion exceeds either the authorized Government cap, set forth in section 2 above, or the Contractor's cap, then the Contractor shall cease work and notify the NASA contracting officer in writing. Within 10 working days of the notification, the Government shall provide direction to the contractor on how to proceed and shall fund any excess effort (including reasonable profit) beyond a cap as necessary to bring the instrument and associated spacecraft to a flight ready condition that meets mutually agreeable standards of quality. Upon completion of the re-design effort as defined above, the EUV instrument shall be deemed satisfactory for all contract purposes. The EUV performance specifications may be different for each of the GOES spacecraft. The Government's financial obligation for this EUV effort ends with the completion,delivery, and corresponding spacecraft level regression testing of the redesigned EUV instrument.

b. Spacecraft level activities associated with the reworked EUV instruments shall not inhibit or delay the entrance into spacecraft storage nor shall it be considered removing the spacecraft from storage. Storage fees shall be earned during the time periods these activities are taking place, if the spacecraft has previously entered storage. Additionally, Contractor shall be entitled to invoice and be paid storage revenue whether or not the EUV rework is completed or installed on the GOES O and/or GOES P spacecraft. GOES O shall be considered in Storage as of May 4, 2005.

c. CLIN changes and Milestone Payments : CLIN 11 shall be increased by the value of $1,900,000, to be paid under the following milestones: EUV Re-Design PDR ($500,000), EUV Re-Design CDR ($500,000), EUV Re-Design Fabrication of 1st Article Telescope assembly ($650,000), Delivery of Re-Designed GOES O EUV to Contractor ($250,000). CLIN 15 shall be increased by $691,280, to be paid under the following milestones: Delivery of GOES P EUV to Contractor ($500,000); Re-installation of GOES P EUV ($191,280). If the work on the EUV re-design effort authorized under this modification is terminated or deemed complete before one or more of the

above milestone payments events is completed, the preceding milestone events which were achieved and the payment amounts for the preceding milestones will be increased to reflect the costs incurred by the Contractor, and the Contractor will be paid those increased amounts upon request.

d. Further, upon delivery of the modified GOES P EUV to the Contractor by Contractor's subcontractor, the Contractor shall provide a cost report of the actual costs incurred by its subcontractor. This report shall show the costs the subcontractor incurred for each billing milestone. If the actual costs incurred by the subcontractor (plus one-half of the subcontractor's fees) are less than $2,400,000 then the value of the contract shall be reduced by the difference and payment of the milestones will be amended accordingly. Further, upon completion of spacecraft level regression tests for the modified GOES P EUV, the Contractor shall provide a cost report of the actual costs incurred by the Contractor, plus one-half of Contractor's subcontractor (ATC) fees. If the actual costs incurred by Contractor (plus one-half of Contractor's subcontractor's fees) exceed $2,000,000, but are less than the Contractor's cap, the contract, as well as CLIN 15 and Milestone P58, will be reduced by the difference between the Contractor's cap and the actual costs incurred. If the actual costs incurred by Contractor (plus one-half of Contractor's subcontractor's fees) are less than or equal to $2,000,000, the contract and CLIN 15 will be reduced by $191,280 and Milestone P58 will be eliminated.

e. Contractor's subcontractor's costs (plus one half the Contractor's subcontractor's fees) incurred under UCA Contract Modifications 110 and 121 will be included in the Government component of the cap. The Contractor's portion of Modifications 110 and 121 (including one-half of Contractor's subcontractor's fees) will be part of the Contractor's cap. Modifications 110 and 121 are hereby considered definitized in accordance with the terms contained herein.

f. Performance based payments OS19 and P39 will not be delayed by the GOES O & GOES P EUV upgrade effort. These milestones will be paid when they would otherwise have been paid assuming the GOES P EUV instrument was to be accepted in its current unmodified condition.

4. As a result of the above changes, the contract is modified as follows:

a. Amend Clause H.3(b) – Pre-Determined Adjustment for Late Delivery, Page H-2 as follows:

From:

(b) If the engineering handover is otherwise delayed by the Contractor by more than 80 days (143 days for GOES N ONLY) from the EHD in the contract schedule, the contractor shall pay to the Government, for each calendar day of delay, beginning with the eighty-first day (144th day for GOES N ONLY) after the EHD in the contract schedule until the actual engineering handover date of said spacecraft, the sum of $50,000, up to a maximum of $12,000,000 for each spacecraft. The form of payment, whether a contract credit or otherwise, will be determined by the Contracting Officer.

To:

(b) If the engineering handover is otherwise delayed by the Contractor by more than 80 days (203 days for GOES N ONLY) from the EHD in the contract schedule, the contractor shall pay to the Government, for each calendar day of delay, beginning with the eighty-first day (204th day for GOES N ONLY) after the EHD in the contract schedule until the actual engineering handover date of said spacecraft, the sum of $50,000, up to a maximum of $12,000,000 for each spacecraft. The form of payment, whether a contract credit or otherwise, will be determined by the Contracting Officer.

b. SECTION B, Clause B.1 DELIVERABLE REQUIREMENTS (18-52.210-90)(OCT 1988) is modified as follows:

1. CLIN 11 is increased from $171,030,315by $1,900,000 to a new total of $172,930,315.
2. CLIN 15 is increased by from $136,447,938 by $691,280 to a new price of $137,139,218.
3. In recognition that GOES O entered storage on May 4, 2005, CLIN 14 is increased from $0 by adding storage payment values for GOES O for the months of May 2005 through June 2006, for an increase in price of $3,962,000. The Description of CLIN 14 is changed to "Spacecraft Storage- GOES O." Descriptive data is added as follows:

Storage Month*	Amount	Invoice Date
May 2005	$283,000	June 2005
June 2005	$283,000	July 2005
July 2005	$283,000	August 2005
August 2005	$283,000	September 2005
September 2005	$283,000	October 2005
October 2005	$283,000	November 2005
November 2005	$283,000	December 2005
December 2005	$283,000	January 2006
January 2006	$283,000	February 2006
February 2006	$283,000	March 2006
March 2006	$283,000	April 2006
April 2006	$283,000	May 2006
May 2006	$283,000	June 2006
June 2006	$283,000	July 2006

*A storage month shall be defined as a period commencing on the 4th day of the month and considered complete on the 3rd of the following month starting with May 4th, 2005.

c. SECTION B, Clause B.2 FIRM FIXED PRICE (18-52.216-78)(DEC 1988) is modified by increasing the price from $729,292,575 by $6,553,280 to a new total of $735,845,855.

d. SECTION B, Clause B.5 EVENTS FOR PERFORMANCE BASED PAYMENTS is changed by adding the following milestone events:

Event No.	Event	Amount	Date
O53	EUV Re-Design PDR	$500,000	8/19/05
O54	EUV Re-Design CDR	$500,000	3/17/06
O55	EUV Re-Design Fabrication of 1st Article Telescope assembly	$650,000	11/30/06
O56	Delivery of Re-Designed GOES O EUV to Contractor	$250,000	5/1/07
P57	Delivery of GOES P EUV to Contractor	$500,000	9/1/08
P58	Re-installation of GOES P EUV	$191,280	10/1/08

For the avoidance of doubt milestone events, dates and amounts may be modified as necessary in accordance with Part 3.c above.

e. SECTION H, Clause H.3, paragraph (f) will be added as follows:

"(f) If the re-design and re-manufacture of the EUV instrument being conducted under this effort results in an impact to the EHD , the EHD will be adjusted on a day-to-day basis. In addition, the $2,000,000 Contractor component of the cap in Part 2.a.i of modification 118, shall be reduced by $7,000 per day of EHD adjustment if this adjustment occurs after the EHD notification date in Clause F.2 to offset the financial impact of the delay in payment of the launch related performance based payments."

5. The following changes are made to the Attachment A, the Statement of Work; Attachment B, the Performance Specification as follows:

Change S-415-22 (PSPEC) paragraph 6.2.1 :

FROM:

6.2.1 Launch and Orbit Raising

The spacecraft configuration shall be verifiable at the government operations center during the entire launch countdown. All stored command loads shall be verifiable during the countdown. Data availability in the LOR period shall be subject only to ground station line-of-sight constraints and the coverage requirements of paragraph 10.1.4. **(MOD16, CCR4094)**

TO:

6.2.1 Launch and Orbit Raising

The spacecraft configuration shall be verifiable at the government operations center during the entire launch countdown. The receipt of valid spacecraft telemetry through the deinterleaved data link, at the government operations control center, shall be a Spacecraft Launch Commit Criteria. All stored command loads shall be verifiable during the countdown. Data availability in the LOR period shall be subject only to ground station line-of-sight constraints and the coverage requirements of paragraph 10.1.4. **(MOD16, CCR4094)**

All changes and additions are to Attachment B of S-415-22

Change to List of Tables as follows

FROM:

Table 9.1.2.1	Wavelength Ranges
Table 9.1.2.2	Required Sensitivities

TO:

Table 9.1.2.1A	Wavelength Ranges for GOES N
Table 9.1.2.1B	Wavelength Ranges for GOES O and P
Table 9.1.2.2A	Required Sensitivities
Table 9.1.2.2B	Channel A and B Extreme Ultraviolet Spectra
Table 9.1.2.3	Channel E Extreme Ultraviolet Spectra

****

Change to List of Figures as follows

FROM:

Figure 9.1.2.1 Solar X-ray Spectra for an Emission Measure of 10^{44} cm^{-3}

TO:

Figure 9.1.2.1 Solar X-ray Spectra for an Emission Measure of 10^{44} cm^{-3}
Figure 9.1.2.2 Channel A and B Extreme Ultraviolet Spectra
Figure 9.1.2.3 Channel E Extreme Ultraviolet Spectra

Change Section 9.1.2.1 as follows

FROM:

9.1.2.1 ***Wavelength Ranges and Threshold Sensitivities*** - Two X-ray channels are required to observe solar fluxes in the 0.05 to 0.3 nm and the 0.1 to 0.8 nm bands, respectively. At least five EUV channels are required to observe solar fluxes in the 10-125 nm range. The preferred and the acceptable range of values for the lower and upper XRS/EUV channel band edges are provided in Table 9.1.2.1.

TO:

9.1.2.1 ***Wavelength Ranges and Threshold Sensitivities***

9.1.2.1.1 GOES N - Two X-ray channels are required to observe solar fluxes in the 0.05 to 0.3 nm and the 0.1 to 0.8 nm bands, respectively. At least five EUV channels are required to observe solar fluxes in the 10-125 nm range. The preferred and the acceptable range of values for the lower and upper XRS/EUV channel band edges are provided in Table 9.1.2.1A.

FROM:

Table 9.1.2.1, Wavelength Ranges **(MOD 32, CCR 6057A)**

Channel	**Preferred Wavelength Range (nm)**		**Acceptable Lower Band Edge Range (nm)**	**Acceptable Upper Band Edge Range (nm)**
	Lower	**Upper**		
XRS-A	0.05	0.4	0 to 0.1	0.3 to 0.5
XRS-B	0.1	0.8	0 to 0.2	0.75 to 1.2
EUV-A	10	25	5 to 12	15 to 27
EUV-B	25	40	17 to 27	34 to 43
EUV-C	40	65	37 to 52	62 to 70
EUV-D	65	100	10 to 85	20 to 110
EUV-E	119	124	114 to 120	123 to 129

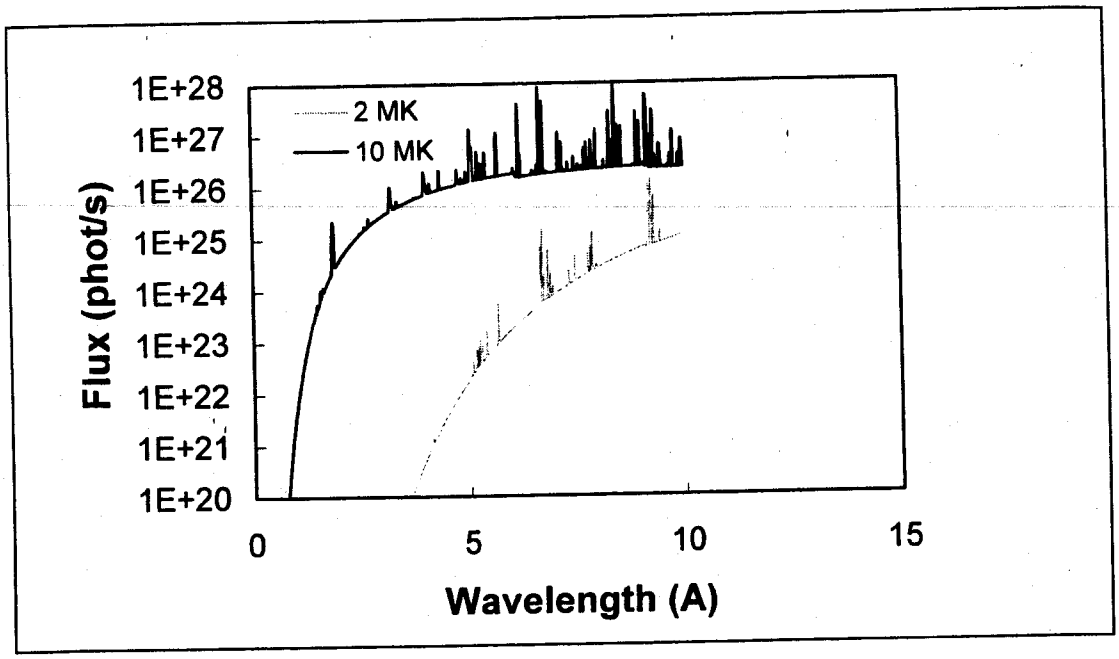
TO:

Table 9.1.2.1A
Wavelength Ranges for GOES N **(MOD 32, CCR 6057A)**

Channel	**Preferred Wavelength Range (nm)**		**Acceptable Lower Band Edge Range (nm)**	**Acceptable Upper Band Edge Range (nm)**
	Lower	**Upper**		
XRS-A	0.05	0.4	0 to 0.1	0.3 to 0.5
XRS-B	0.1	0.8	0 to 0.2	0.75 to 1.2
EUV-A	10	25	5 to 12	15 to 27
EUV-B	25	40	17 to 27	34 to 43
EUV-C	40	65	37 to 52	62 to 70
EUV-D	65	100	10 to 85	20 to 110
EUV-E	119	124	114 to 120	123 to 129

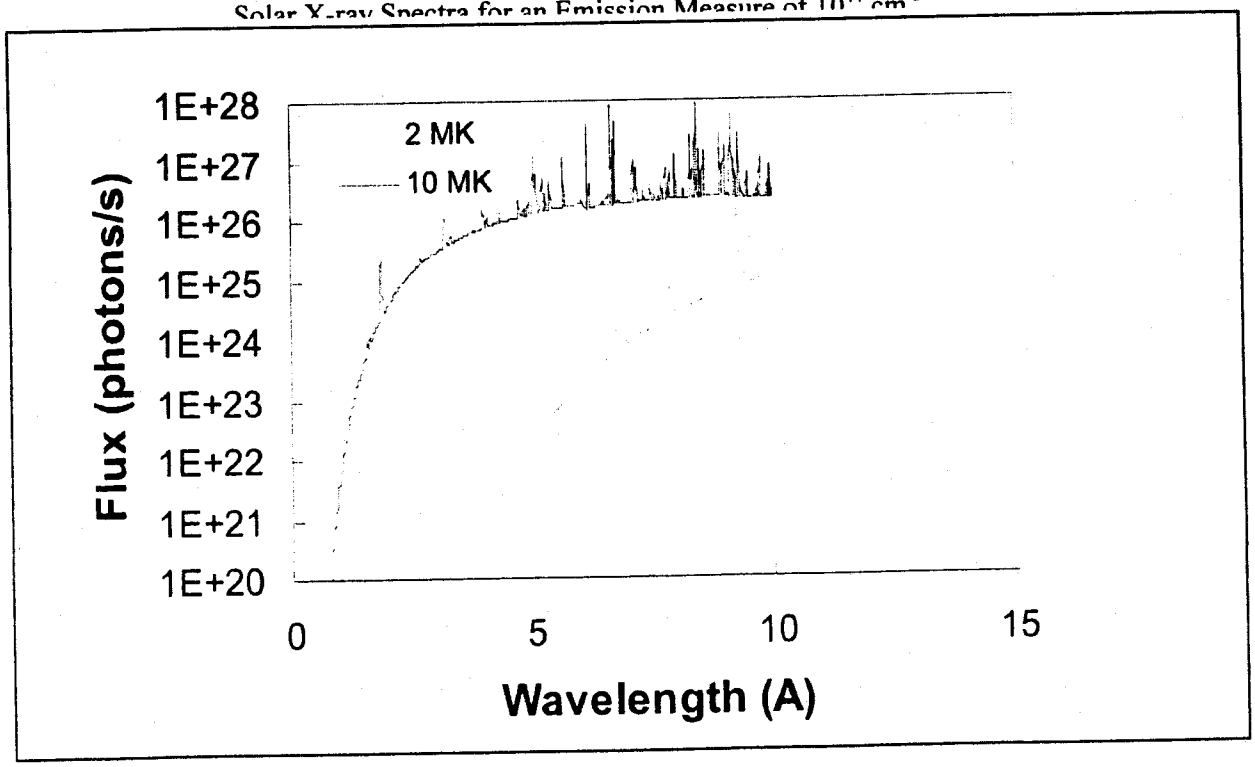
FROM:

Figure 9.1.2.1
Solar X-ray Spectra for an Emission Measure of 10^{44} cm^{-3}



TO:

Figure 9.1.2.1
Solar X-ray Spectra for an Emission Measure of 10^{44} cm^{-3}



Add the following Section 9.1.2.1.2 after Figure 9.1.2.1 in Section 9.1.2.1.1

9.1.2.1.2 GOES O & P - Two X-ray channels are required to observe solar fluxes in the 0.05 to 0.3 nm and the 0.1 to 0.8 nm bands, respectively. At least five EUV channels are required to observe solar fluxes in three wavebands in the 10-125 nm range with band edges defined by channels A, B and E in Table 9.1.2.1B. EUV spectral selectivity shall be obtained in part by a transmission grating. Minimization of field angle dependence in wavebands corresponding to EUV-A and EUV-B shall be obtained by providing data from two channels, EUV-C and EUV-D with nominally the same band edges as EUV-A and EUV-B respectively, but inverted in the grating dispersion plane in each case. The preferred and the acceptable range of values for the lower and upper XRS/EUV channel band edges are provided in Table 9.1.2.1B.

The instrument shall be capable of measuring fluxes above a threshold sensitivity for each of the seven channels listed in Table 9.1.2.1B. Threshold sensitivity is defined as the minimum in-band solar flux that will produce a mean signal equal to the standard deviation of the data (instrumental noise) over a 10-second interval. For the two X-ray channels, the in-band solar spectrum varies several orders of magnitude with wavelength as shown in Figure 9.1.2.1 (from Mewe and Groenschild, 1981, Astron. Astrophys. Suppl. Ser., vol. 45, pp 11-52). A solar spectrum at 2 x 10^6 K shall be assumed for the two X-ray channels for threshold sensitivity determination. For the EUV channels, the solar spectrum is characterized in channels B and E by dominant lines at He 30.4 nm and Lyman alpha at 121.5 nm respectively. The threshold sensitivity and field angle sensitivity shall be calculated using the solar spectrum defined by Figure 9.1.2.2 and Table 9.1.2.2B for channels A and B, and by Figure 9.1.2.3 and Table 9.1.2.3 for channel E (from Tom Woods and Gary Rottman, "Solar ultraviolet variability over time periods of aeronomic interest," Comparative Aeronomy in the Solar System, edited by M. Mendillo, A. Nagy, and M. Stefanis, AGU Monograph, 2001).

The out-of-band rejection shall be such that < 10% of the observed signal comes from out-of-band for the assumed solar spectrum. Alternatively, a method of measuring out-of-band radiation shall be provided. Over the duration of the mission, the instrument response shall not change by > 5% due to deposition of outgassed materials onto optical surfaces.

Table 9.1.2.1B
Wavelength Ranges for GOES O and P **(MOD 32, CCR 6057A)**

Channel	**Preferred Wavelength Range (nm)**		**Acceptable Lower Band Edge Range (nm)**	**Acceptable Upper Band Edge Range (nm)**
	Lower	**Upper**		
XRS-A	0.05	0.4	0 to 0.1	0.3 to 0.5
XRS-B	0.1	0.8	0 to 0.2	0.75 to 1.2
EUV-A	10	25	5 to 12	15 to 27
EUV-B	25	40	17 to 27	34 to 43
EUV-C	10	25	≅EUV-A	≅EUV-A
EUV-D	25	40	≅EUV-B	≅EUV-B
EUV-E	119	124	114 to 120	123 to 129

Figure 9.1.2.2
Channel A and B Extreme Ultraviolet Spectra

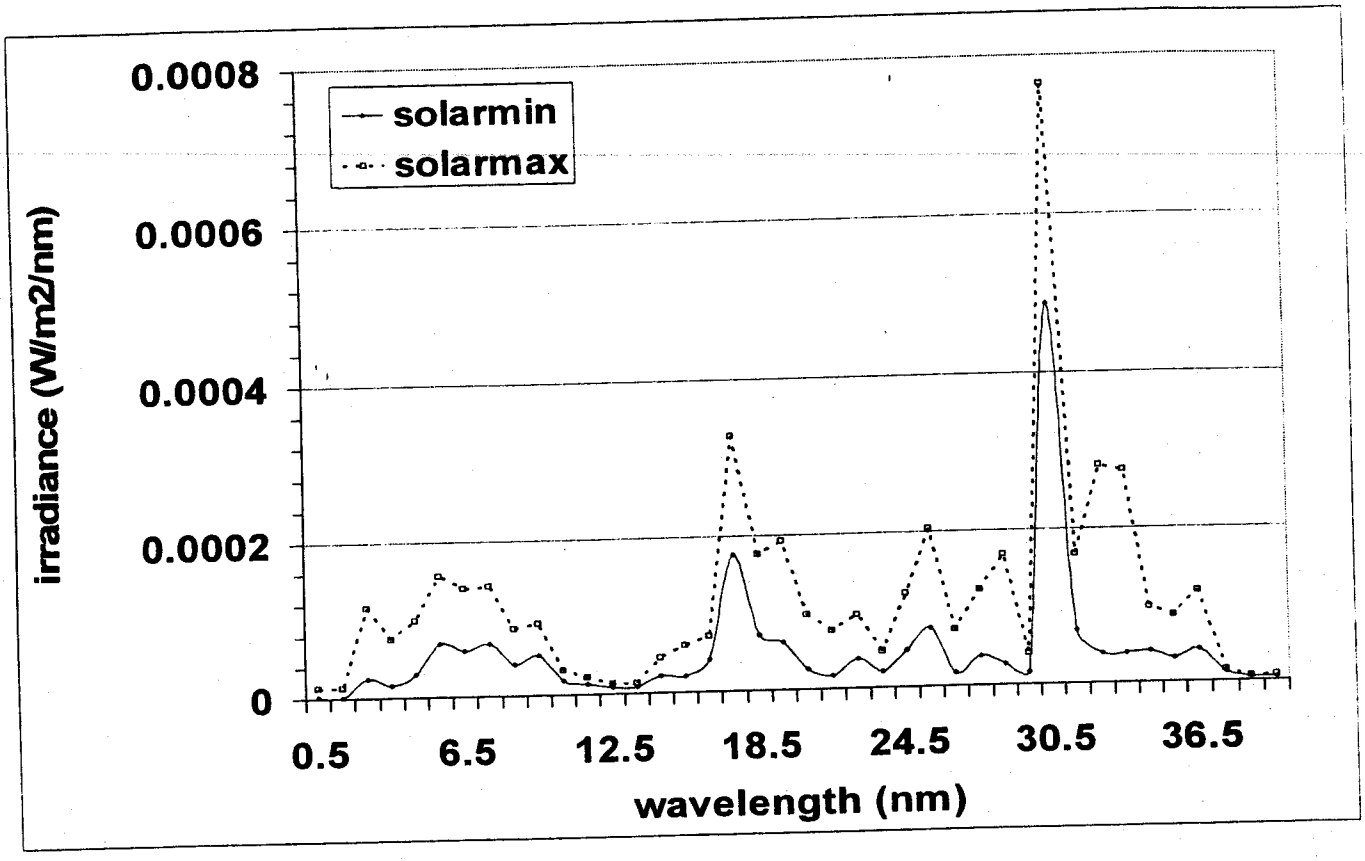
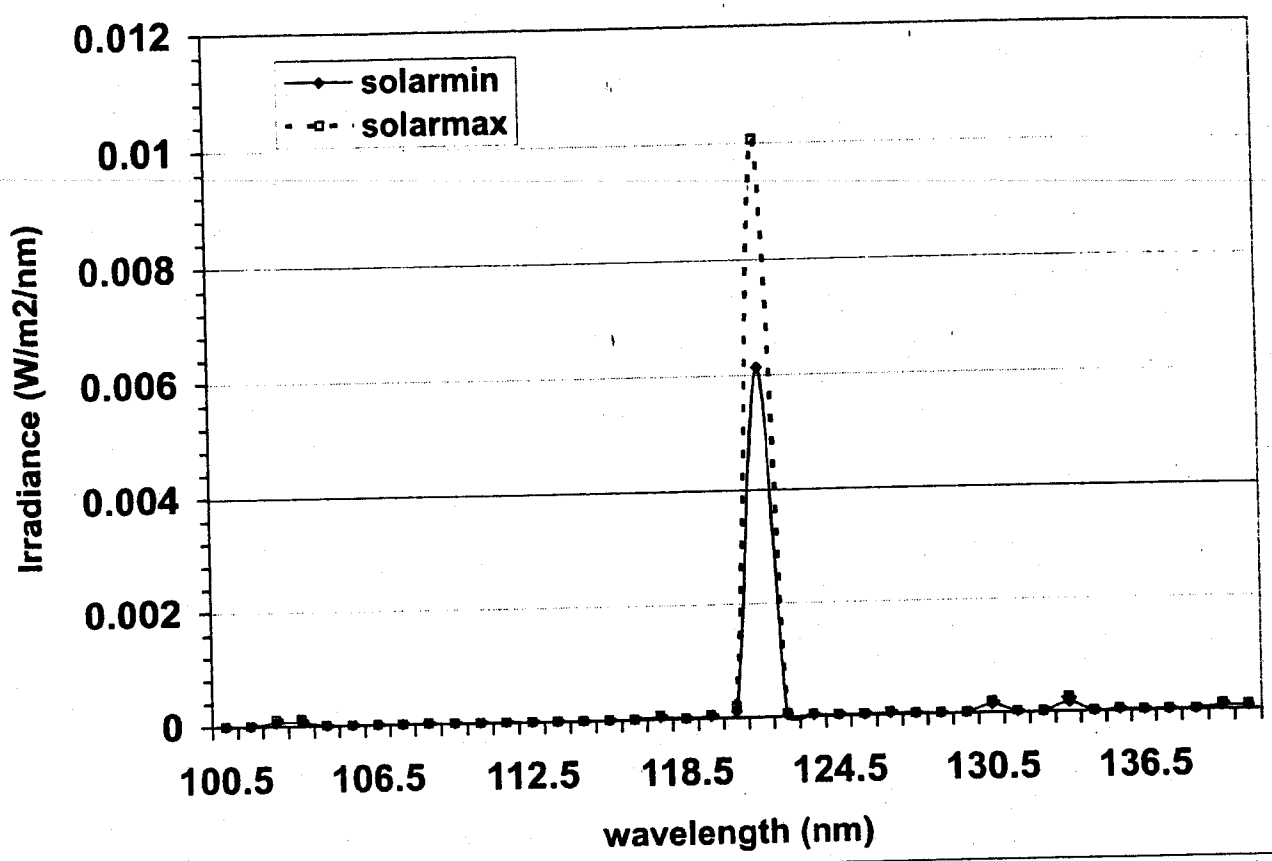


Figure 9.1.2.3
Channel E Extreme Ultraviolet Spectra



FROM:

9.1.2.2 ***Threshold Fluxes and Dynamic Range*** - The instrument shall be capable of measuring fluxes for each channel over the specified dynamic ranges given in Table 9.1.2.2, when the fluxes are above the given thresholds.

Table 9.1.2.2
Required Sensitivities

Channel	Threshold Flux	Min. Dynamic Range
XRS-A	5×10^{-9} W/m^2	10^5
XRS-B	2×10^{-8} W/m^2	10^5
EUV-A	1×10^{-6} W/m^{2}nm*	10^3
EUV-B	2×10^{-6} W/m^2 nm*	10^3
EUV-C	1×10^{-6} W/m^{2}nm*	10^2
EUV-D	2×10^{-6} W/m^{2}nm*	10^2
EUV-E	1×10^{-4} W/m^{2}nm*	10^2

- The threshold flux levels represent values 1/10 the expected minimum solar flux.

TO:

9.1.2.2 ***Threshold Fluxes and Dynamic Range*** - The instrument shall be capable of measuring fluxes for each channel over the specified dynamic ranges given in Table 9.1.2.2A, when the fluxes are above the given thresholds.

Table 9.1.2.2A
Required Sensitivities

Channel	GOES N Threshold Flux	GOES O & P Threshold Flux	GOES N Min. Dynamic Range	GOES O & P Min. Dynamic Range
XRS-A	5×10^{-9} W/m^2	5×10^{-9} W/m^2	10^5	10^5
XRS-B	2×10^{-8} W/m^2	2×10^{-8} W/m^2	10^5	10^5
EUV-A	1×10^{-6} W/m^{2}nm*	**	10^3	10^3
EUV-B	2×10^{-6} W/m^2 nm*	**	10^3	10^3
EUV-C	1×10^{-6} W/m^{2}nm*	**	10^2	10^3
EUV-D	2×10^{-6} W/m^{2}nm*	**	10^2	10^3
EUV-E	1×10^{-4} W/m^{2}nm*	**	10^2	10^2

* The threshold flux levels represent values 1/10 the expected minimum solar flux.
** The EUV channel threshold flux is defined as one tenth of the specified solar minimum EUV flux (Figure 9.1.2.2 and Table 9.1.2.2B for Channels A, B, C, & D; Figure 9.1.2.3 and Table 9.1.2.3 for Channel E) over the specified wavelength ranges. The EUV channel calibrated response function will be integrated over the solar minimum spectrum to provide a calculated EUV channel output current for the solar minimum spectrum. The EUV channel signal-to-noise ratio will be calculated using one tenth of the calculated EUV channel output current for the solar minimum spectrum.

Table 9.1.2.2B
Channel A and B Extreme Ultraviolet Spectra

Wavelength, nm	Irradiance, W/m²/nm Solarmin	Irradiance, W/m²/nm Solarmax
0.5	1.98646E-06	1.31206E-05
1.5	1.32431E-06	1.31206E-05
2.5	2.47434E-05	0.000116591
3.5	1.61811E-05	7.6019E-05
4.5	3.01015E-05	9.90039E-05
5.5	6.90927E-05	0.000156288
6.5	5.93799E-05	0.000140612
7.5	6.7884E-05	0.000143167
8.5	4.12483E-05	8.73639E-05
9.5	5.18571E-05	9.36021E-05
10.5	1.88998E-05	3.17894E-05
11.5	1.3786E-05	2.25953E-05
12.5	8.71977E-06	1.40824E-05
13.5	8.3711E-06	1.36365E-05
14.5	2.26594E-05	4.64517E-05
15.5	2.06079E-05	6.14116E-05
16.5	4.19805E-05	7.23325E-05
17.5	0.000176738	0.000328203
18.5	7.20817E-05	0.000176672
19.5	6.17331E-05	0.000192113
20.5	2.56011E-05	9.65674E-05
21.5	1.78135E-05	7.62061E-05
22.5	3.90141E-05	9.58186E-05
23.5	2.08452E-05	4.70684E-05
24.5	4.86399E-05	0.000121259
25.5	7.54232E-05	0.000204246
26.5	1.80056E-05	7.39129E-05
27.5	3.81617E-05	0.000124751
28.5	2.71274E-05	0.000168353
29.5	1.66459E-05	4.10321E-05
30.5	0.00048639	0.000764119
31.5	6.9873E-05	0.000168114
32.5	3.84762E-05	0.000280222
33.5	3.80452E-05	0.000275105
34.5	4.06505E-05	9.80896E-05
35.5	3.14644E-05	8.71879E-05
36.5	4.24667E-05	0.000118312
37.5	1.27451E-05	1.49246E-05
38.5	5.46406E-06	6.39841E-06
39.5	4.80221E-06	6.86235E-06
40.5	8.05375E-06	1.15088E-05

Table 9.1.2.3
Channel E Extreme Ultraviolet Spectra

Wavelength, nm	Irradiance, W/m²/nm Solarmin	Irradiance, W/m²/nm Solarmax
100.5	7.55053E-06	1.08803E-05
101.5	8.72673E-06	1.25752E-05
102.5	7.16483E-05	0.000122733
103.5	7.45067E-05	0.000126214
104.5	1.20423E-05	1.7353E-05
105.5	1.01959E-05	1.46923E-05
106.5	9.73646E-06	1.39523E-05
107.5	1.03518E-05	1.47927E-05
108.5	1.72795E-05	2.48997E-05
109.5	1.16231E-05	1.67488E-05
110.5	1.23988E-05	1.78666E-05
111.5	1.27864E-05	1.49729E-05
112.5	1.21183E-05	1.8129E-05
113.5	1.08757E-05	1.27354E-05
114.5	7.36118E-06	8.61995E-06
115.5	1.20976E-05	1.41663E-05
116.5	1.36699E-05	1.60075E-05
117.5	5.02279E-05	7.59948E-05
118.5	1.53921E-05	1.80242E-05
119.5	4.64948E-05	6.44883E-05
120.5	0.000123556	0.000213752
121.5	0.006140863	0.010064875
122.5	5.11615E-05	6.8096E-05
123.5	3.56759E-05	4.89116E-05
124.5	2.71882E-05	3.72206E-05
125.5	2.62909E-05	3.48092E-05
126.5	3.61018E-05	5.41527E-05
127.5	2.07059E-05	2.669E-05
128.5	1.72212E-05	2.15781E-05
129.5	1.92204E-05	2.6428E-05
130.5	0.000159374	0.000205114
131.5	2.7176E-05	3.2421E-05
132.5	2.03144E-05	2.53523E-05
133.5	0.000169779	0.000266214
134.5	1.80775E-05	2.26692E-05
135.5	4.16204E-05	5.12763E-05
136.5	2.66171E-05	3.36174E-05
137.5	2.8605E-05	3.54416E-05
138.5	2.86423E-05	3.47432E-05
139.5	7.1356E-05	0.000114312
140.5	6.34112E-05	9.08049E-05

FROM:
9.1.2.5 ***Temporal Resolution*** - The temporal resolution of the X-ray fluxes shall be at least 3 seconds and the flux values shall be transmitted to ground in real-time. The time delay between flux measurements in the two X-ray channels shall be less than 0.1 second. The instrument response to an instantaneous change in X-ray flux (a step function) shall be such that the telemetered output of each channel shall be within 10% of its final value within the specified temporal resolution. The analytical channel response function shall be specified by the spacecraft contractor to sufficient accuracy to allow for possible ground correction of the data. Each EUV channel shall be sampled at least every 30 seconds.

TO:
9.1.2.5 ***Temporal Resolution***
9.1.2.5.1 GOES N - The temporal resolution of the X-ray fluxes shall be at least 3 seconds and the flux values shall be transmitted to ground in real-time. The time delay between flux measurements in the two X-ray channels shall be less than 0.1 second. The instrument response to an instantaneous change in X-ray flux (a step function) shall be such that the telemetered output of each channel shall be within 10% of its final value within the specified temporal resolution. The analytical channel response function shall be specified by the spacecraft contractor to sufficient accuracy to allow for possible ground correction of the data. Each EUV channel shall be sampled at least every 30 seconds.

9.1.2.5.2 GOES O & P - The temporal resolution of the X-ray fluxes shall be at least 3 seconds and the flux values shall be transmitted to ground in real-time. The time delay between flux measurements in the two X-ray channels shall be less than 0.1 second. The time delay between flux measurements in EUV channels A and C or EUV channels B and D shall be minimized to the extent practical without modifying the baseline DPU solely for this purpose and with emphasis on channels A and C. The instrument response to an instantaneous change in X-ray flux (a step function) shall be such that the telemetered output of each channel shall be within 10% of its final value within the specified temporal resolution. The analytical channel response function shall be specified by the spacecraft contractor to sufficient accuracy to allow for possible ground correction of the data. Each EUV channel shall be sampled at least every 30 seconds.

FROM:
9.1.2.6 ***Angular Response*** - The instrument response, including the combined effect of spacecraft pointing and sensor field-of-view (FOV), shall not deviate by more than 5%, with a goal of 2%, for point sources of constant flux within 20 arc-minutes of the solar disk center.

TO:
9.1.2.6 ***Angular Response***
9.1.2.6.1 GOES N - The instrument response, including the combined effect of spacecraft pointing and sensor field-of-view (FOV), shall not deviate by more than 5%, with a goal of 2%, for point sources of constant flux within 20 arc-minutes of the solar disk center.

9.1.2.6.2 GOES O & P - The instrument response, including the combined effects of spacecraft pointing, sensor field-of-view (FOV) and channel spectral response shall not deviate by more than 5% for point sources of constant flux within 20 arc-minutes of the solar disk center. Ground processing of multiple data channels to achieve this uniform response may be required by 9.1.2.1.2.

Change S-415-22 (PSPEC) paragraph 10.11.5 :

FROM:

10.11.5 **Purge Requirements**

Refer to the GFE instrument ICDs and CDRL SDA-3.2.17-01 for instrument purge requirements and launch vehicle requirements.

TO:

10.11.5 **Purge Requirements**

Refer to the GFE instrument ICDs and CDRL SDA-3.2.17-01 for instrument purge requirements and launch vehicle requirements.

The launch vehicle mated PLF shall be volumetrically purged with MIL-P-27401C Type I, Grade B GN2, starting from tower rollback through launch.

Change S-415-23 (SOW) paragraph 3.4.6:

FROM:

3.4.6 Launch Site Tests

The spacecraft contractor shall prepare a launch site integration plan as defined in CDRL I&T-3.4.6-01.

TO:

3.4.6 Launch Site Tests

The spacecraft contractor shall prepare a launch site integration plan as defined in CDRL I&T-3.4.6-01. For GOES N only, the spacecraft contractor shall perform a battery functional test at the launch base. The battery test shall be performed with the batteries integrated on the spacecraft. The batteries shall be charged and discharged twice. The batteries shall, within one charge cycle and subject to thermal limitations, reach a minimum State of Charge (SOC) of 35%. After the first charge, the batteries shall be discharged and the process shall be repeated once. The spacecraft contractor shall develop a test plan and procedure with recommended success criteria.

Add new subsection to paragraph 3.4 of S-415-23 (SOW) as follows:

3.4.11 SXI Related Tasks.

The spacecraft contractor shall provide the resources required to remove, reinstall, and test the SXI power, data, and camera electronics boxes (PEB, DEB, and CEB) on the GOES O spacecraft and the DEB and PEB on the GOES N. In addition, the spacecraft contractor shall provide the resource required to modify the GOES N blankets so as to ensure adequate venting. This shall be done to accommodate the circuit board wedgelock retorquing effort. This effort shall only be executed once.

6. Release Language:

General Release

All references to requests for equitable adjustment in the releases and waivers contained herein shall mean claims under the Contract Disputes Act of 1978 and the Disputes clause of the Contract, FAR 52.233-1 (OCT 1995)(Alternate I).
The Contractor hereby withdraws and forever waives the request for equitable adjustment/claims associated with their proposal for CCR 4403 Extreme Ultraviolet Performance Specification Change, Modifications 110 and 121, the GOES N launch site battery test effort specified in Task Assignment 153 through May 30, 2005 and Modification 107 through May 30, 2005; for all costs and fee associated with adding the requirement for payload fairing GN2 purge for GOES N, O, and P, including work authorized by Task Assignment 151; for Clause H.4 cost associated with integration and test support provided for the GOES N and GOES O SXI CEB, DEB, and PEB rework associated with Task Assignments 148 (through March 1, 2005), 150 (through March 31, 2005), and 152 (through April 1, 2005); for Clause H.4 cost associated with integration and test support associated with Task Assignment 153 (through date May 30, 2005); for expenses incurred in pursuing prior EUV design modifications, including the grazing incidence EUV design option (through date May 23, 2005); for EUV specification commercial impracticability of performance for GOES N, O & P EUV instruments; for amounts the contractor would be entitled to under Clause C.2 SPECIAL TASK ASSIGNMENTS AND REPORTS for task assignments 100 (through May 23, 2004), 106R3 (through July 1, 2004), 111R5 (through February 1, 2005), and 122R1 (through December 31, 2003).

The contractor reserves all rights under the contract including those for equitable adjustment that may arise from facts or circumstances not specifically addressed in the subject matter of this modification, including but not limited to its right to assert delay and disruptions for late delivery on GOES N.

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF PAGES 2

2. AMENDMENT/MODIFICATION NO. 119

3. EFFECTIVE DATE See Blk 16

4. REQUISITION/PURCHASE REQ. NO. N/A

5. PROJECT NO. (If applicable) GOES O

6. ISSUED BY CODE 210.Y

NASA/Goddard Space Flight Center
Bldg 6, Room W246
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE

NASA Goddard Space Flight Center
DCMA Boeing Space & Comm Seal Beach
El Segundo, California 90245

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)

Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

N/A

Amt: $0.00

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

X D. OTHER Specify type of modification and authority) Clause H.4--Additional Goverment. Accommodations

E. IMPORTANT: Contractor XXX is not, is required to sign this document and return ____copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

The purpose of this modification is to revise the Engineering Handover Date identified in clause F. 2 for the GOES O and P Spacecraft.

Accordingly:

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Glenn Stewart

15B. CONTRACTOR/OFFEROR

(Signature of person authorized to sign)

15C. DATE SIGNED

16B. UNITED STATES OF AMERICA BY Glenn Stewart (Signature of Contracting Officer)

16C. DATE SIGNED 11/14/05

1. In accordance with Clause H.4—Additional Government Accommodations, paragraph (g) of contract NAS 5-98069, the Contractor (BSS) is hereby notified of a revision to the Engineering Handover Date (EHD) for the GOES O and P Spacecraft. This notification serves to fulfill the Government's contractual obligation to amend the contract via modification and to notify the contractor (BSS) of a revised EHD 18 months in advance of the current Engineering Handover Date.

As stated in Clause F.2 of contract NAS 5-98069, the Engineering Handover for GOES O is hereby changed from February 28, 2007 to April 30, 2007 and the Engineering Handover for GOES P is hereby changed from October 30, 2007 to January 31, 2008.

2. Replace page F-3 with the enclosed revised F-3 change page.

The fixed Price of this contract and the funds allotted for the performance thereof shall not be deemed to be increased by the modification. This modification also represents a complete and equitable settlement for the work associated with this change and releases the Government from any and all liability under this contract for further equitable adjustment attributed to such facts and circumstances giving rise by this modification, except as provided for in Clause H.4(g).

End of Modification

F.2 ENGINEERING HANDOVER DATES AND STORAGE DATES

The following dates are defined as the engineering handover dates and the earliest dates at which the spacecraft may be placed into ground storage:

	Earliest Ground Storage Date	Engineering Handover Date
GOES N	January 1, 2002	December 31, 2004
GOES O	January 1, 2003	April 30, 2007
GOES P	January 1, 2005	January 31, 2008

The contractor shall place each GOES spacecraft or replacement spacecraft into storage, if required, at the contractor's facility immediately following successful completion of spacecraft Integration and Test (I&T) (including integration and test of the delivered GFE instruments) and successful completion of the pre-storage review, but no earlier than the dates specified for Earliest Storage Date (ESD). No storage charges, as defined in Clause H.4, shall be paid prior to the ESD or for any storage resulting from delays in the Contractor-provided launch.

(End of clause)

F.3 SECTION F CLAUSES INCORPORATED BY REFERENCE

(52.242-15) STOP-WORK ORDER (AUG 1989)
(52.247-34) F.O.B. DESTINATION (NOV 1991)

(End of By Reference Section)

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF PAGES 16

2. AMENDMENT/MODIFICATION NO. 120

3. EFFECTIVE DATE See block 16C

4. REQUISITION/PURCHASE REQ. NO. n/a

5. PROJECT NO. (If applicable) GOES N

6. ISSUED BY CODE 210.Y
NASA/Goddard Space Flight Center
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE
NASA Goddard Space Flight Center
Code 210.7
Greenbelt, MD 20771

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)
Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
N/A Amt: $0

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: Clause H.15 No Cost Technical Trades

D. OTHER Specify type of modification and authority) Mutual Agreement

E. IMPORTANT: Contractor is not, XXX is required to sign this document and return _4___ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This supplemental agreement recognizes Horse Trade agreement No. 28.

Accordingly,

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)
Mr. Scott Ingersoll
Manager, NASA Contracts, BSS

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
Glenn Stewart

15B. CONTRACTOR/OFFEROR
Scott R Ingersoll
(Signature of person authorized to sign)

15C. DATE SIGNED March 20, 2006

16B. UNITED STATES OF AMERICA
BY (Signature of Contracting Officer)

16C. DATE SIGNED 3/21/06

Horse Trade 28 Additions, Deletions, and Amendments

1. Make the following changes to: Attachment B – Performance Specification (S-415-22)

a. In Accordance With CCR 6377, change the following paragraphs:

FROM:

10.11.2.1 Spacecraft External Requirements

...Spacecraft and/or instrument surfaces shall be bagged or covered during overnight periods or when contamination generating activities occur within the cleanroom facility.

TO:

10.11.2.1 Spacecraft External Requirements

...Spacecraft and/or instrument surfaces shall be bagged or covered during periods of inactivity greater than 5 days (one day is 24 hours). Inactivity shall be defined as a period in which no planned mechanical or test activities, other than routine maintenance and surveillance, are performed. If the yoke assembly containing the SXI is not integrated with the spacecraft nor installed on the solar offloader, it shall be bagged or covered during periods of inactivity greater than 24 hours. The spacecraft and/or instrument surfaces shall be bagged or covered when contamination generating activities result in greater than a Class 100K environment. Exceptions to the 5 day and the 24 hour rule, for the spacecraft and yoke assembly (containing the SXI) respectively, shall be approved by the government. **(CCR6377B, Mod120)**

Waivers to Performance Specification (S-415-22)

2. Incorporate the following waivers to Attachment B – GOES N-P Performance Specification (S-415-22)

Description of the Waivers:

a. Waiver W4425A: As documented in CCR 6275A; waiver of requirement for channel out-of-band spurious emissions for GOES O for both primary & redundant configurations of the DCPI service in-band spurious emissions.
b. Waiver W4424A: As documented in CCR 6277A; waiver of requirement for channel out-of-band spurious emissions for GOES O for both primary & redundant configurations of the DCPR service in-band spurious emissions.
c. Waiver W4426A: As documented in CCR 6279A; waiver of requirement for channel out-of-band spurious emissions for GOES Ofor both primary & redundant configurations of the EMWIN service in-band spurious emissions.
d. Waiver W4429A: As documented in CCR 6283A; waiver of requirement for channel out-of-band spurious emissions for GOES O for both primary & redundant configurations of the SAR service in-band spurious emissions.

e. Waiver W4428A: As documented in CCR 6285A; waiver for out-of-band spurious emissions for GOES O for both primary and redundant configurations of the WEFAX service in-band spurious emissions.
f. Waiver W6901C: As documented in CCR 6371C; waiver for out gassing requirements for Delta IV.
g. Waiver W6908: As documented in CCR 6375; waiver to the PSPEC temperature cycling requirement of HEPAD SN02.
h. Waiver W6915A: As documented in CCR 6379A; waiver to the PSPEC requirement of 350 hours of failure-free performance testing operations for EPEAD West (SN02).
i. Waiver W6926A: As documented in CCR 6385A; waiver of requirement for channel out-of-band spurious emissions for GOES O for both primary and redundant configurations of the MDL service in-band spurious emissions.
j. Waiver W6924A: As documented in CCR 6386B; waiver to the P-SPEC modulation limiter for GOES O (SN05).
k. Waiver W6925A: As documented in CCR 6387A; waiver of requirement for channel out-of-band spurious emissions for GOES O for both primary & redundant configurations of the SD service in-band spurious emissions.
l. Waiver W6909C: As documented in CCR 6380; waiver for relief on the NPR specification from 20 dB to 18 dB only for the case where the SAR is in the fixed gain mode for GOES N.

3. Make the following changes to Attachment A, Statement of Work (S-415-23)

a. **In Accordance with CCR 4399,**

Change S-415-23 (SOW) paragraph 3.6.3.2 and 3.6.3.3:

FROM
3.6.3.2 Spacecraft Checkout

The spacecraft contractor shall provide all personnel, services, and materials required to complete the orbit raising within 18 days and perform spacecraft bus checkout within 6 days thereafter.

TO:
3.6.3.2 Spacecraft Checkout

The spacecraft contractor shall provide all personnel, services, and materials required to complete the orbit raising and spacecraft bus checkout no earlier than 22 days for GOES N and no earlier than 18 days for GOES O and GOES P.

FROM:
3.6.3.3 Engineering Handover

The spacecraft contractor shall provide all personnel, services, and materials required to perform an engineering handover to NASA after spacecraft bus checkout, at Launch + 24 days, at which time NASA assumes responsibility for the health and safety of the spacecraft. The spacecraft contractor shall perform an engineering review to denote the

completion of handover in accordance with CDRL OPS-3.6.3-01. The spacecraft contractor shall present an LOR data review within 5 weeks of this handover (L+2 months) in accordance with CDRL OPS-3.6.3-02.

TO:
3.6.3.3 Engineering Handover

The spacecraft contractor shall provide all personnel, services, and materials required to perform an engineering handover to NASA after spacecraft bus checkout, no earlier than Launch + 22 for GOES N and no earlier than 18 days for GOES O and GOES P, at which time NASA assumes responsibility for the health and safety of the spacecraft. The spacecraft contractor shall perform an engineering review to denote the completion of handover in accordance with CDRL OPS-3.6.3-01. The spacecraft contractor shall present an LOR data review within 5 weeks of this handover (L+2 months) in accordance with CDRL OPS-3.6.3-02.

Waivers to Statement of Work (S-415-23)

4. Incorporate the following waivers to Attachment A – GOES N-P Statement of Work (S-415-23)

a. Waiver W4429A: As documented in CCR 6283A; waiver of requirement for channel out-of-band spurious emissions for GOES O for both primary & redundant configurations of the SAR service in-band spurious emissions.

Changes to Imager ICD (DS80667-H00-010).

5. Make The Following Changes To Attachment C – GOES N-P Imager ICD (DS80667-H00-010).

Reference CCR's: 6392C & 6399A

Description of the Changes:

FROM: Para 2.1 – delete the following 3 reference documents

S-415-05	Performance Specification for GOES-NO/PQ Imager and Sounder Instruments
GSFC X-900-97-004	Charged Radiation Exposure of Geostationary Orbits for the GOES N, O, P, Q Satellite Program
GSFC S-415-29	Launch Site Purge Plan for GOES

TO:

~~S-415-05 Performance Specification for GOES-NO/PQ Imager and Sounder Instruments~~

~~GSFC X-900-97-004 Charged Radiation Exposure of Geostationary Orbits for the GOES N, O, P, Q Satellite Program~~

~~GSFC S-415-29 Launch Site Purge Plan for GOES~~

FROM: Para 2.4: - delete the following:

ASTM E 595-93 Standard Method for Total Mass Loss and Collected Volatile Condensable Materials for Outgassing in a Vacuum Environment

TO:

~~ASTM E 595-93 Standard Method for Total Mass Loss and Collected Volatile Condensable Materials for Outgassing in a Vacuum Environment~~

FROM: Table 3.1.5-1 Imager Part Numbers

Module	SN01	SN08	SN09
Imager Sensor	EM187190G1	8187190G1	8187190G2
Imager Electronics		8147195G6	8147195G7
Imager Power Supply		8147341G6	8147341G6

TO: Table 3.1.5-1 Imager Part Numbers

Module	SN01	SN08	SN09	SN10
Imager Sensor	EM187190G1	8187190G1	8187190G2	8187190G3
Imager Electronics		8147195G6	8147195G7	8147195G8
Imager Power Supply		8147341G6	8147341G6	8147341G6

Waivers to Imager ICD (DS80667-H00-010)

6. Incorporate the following waivers to Attachment C of The Imager ICD

Description of Waivers:

a. Waiver W6911: As documented in CCR 6376; waiver to relieve the scan mirror temperature requirements.

b. Waiver W6912: As documented in CCR 6378; waiver to the Imager and Sounder ICD for the predicted exceedance of Imager Electronics and the Sounder Electronics pyroshock requirements during pre-separation events on the Delta IV LV.

Waivers to Sounder ICD (DS80667-H00-012)

7. Incorporate the following waivers to Attachment D – GOES N-P Sounder ICD (DS80667-H00-011).

Reference CCR's: 6376, 6378, 7065A, 7093A, & 7102A.

Description of Waivers:

a. Waiver W6912: As documented in CCR 6378; waiver to the Imager and Sounder ICD for the predicted exceedance of Imager Electronics and the Sounder Electronics pyroshock requirements during pre-separation events on the Delta IV LV.
b. Waiver W6918A: As documented in CCR 7065A; waiver of Sounder electronics box mass properties requirement S/N 09.
c. Waiver W6919A: As documented in CCR 7093A; waiver of Sounder electronics box mass properties requirement S/N 10.
d. Waiver: As documented in CCR 7102A; waiver of Sounder electronics box mass properties requirement S/N 11.
e. Waiver W6911: As documented in CCR 6376; waiver to relieve the scan mirror temperature requirements.

Changes to Sounder ICD (DS80667-H00-012)

8. Incorporate the following changes to Attachment D – GOES N-P Sounder ICD (DS80667-H00-012).

Reference CCR's: 6392C & 6401B

Description of Changes:

FROM: Para 2.1 – delete the following 3 reference documents

S-415-05	Performance Specification for GOES-NO/PQ Imager and Sounder Instruments
GSFC X-900-97-004	Charged Radiation Exposure of Geostationary Orbits for the GOES N, O, P, Q Satellite Program
GSFC S-415-29	Launch Site Purge Plan for GOES

TO:

~~S-415-05 Performance Specification for GOES-NO/PQ Imager and Sounder Instruments~~
~~GSFC X-900-97-004 Charged Radiation Exposure of Geostationary Orbits for the GOES N, O, P, Q Satellite Program~~
~~GSFC S-415-29 Launch Site Purge Plan for GOES~~

FROM: Para 2.4: - delete the following:

ASTM E 595-93 Standard Method for Total Mass Loss and Collected Volatile Condensable Materials for Outgassing in a Vacuum Environment

TO:

~~ASTM E 595-93 Standard Method for Total Mass Loss and Collected Volatile Condensable Materials for Outgassing in a Vacuum Environment~~

FROM: Table 3.1.5-1 Sounder Part Numbers

Module	SN01	SN08	SN09
Sounder Sensor	EM188040G1	8188040G1	8188040G2
Sounder Electronics		8148043G6	8148043G6
Sounder Power Supply		8148546G5	8148546G5

TO: Table 3.1.5-1 Sounder Part Numbers

Module	SN01	SN08	SN09	SN10
Sounder Sensor	EM188040G1	8188040G1	8188040G2	8188040G3
Sounder Electronics		8148043G6	8148043G6	8148043G8
Sounder Power Supply		8148546G5	8148546G5	8148546G5

FROM:

3.2.1 Mass Properties

For GOES N Imager, the typical weight, moment of inertia, and center of gravity for each of the three modules (with tolerances) shall be as shown in Table 3.2.1-1. *See Appendix 5.8.1, Table 5.8.1-1 for mass properties of GOES O/PQ Imagers.* The actual values for these parameters shall be supplied by the instrument contractor in the final data packages upon completion of the mass properties measurements for each specific instrument. Final data packages will be delivered with each sounder.

3.2.1.1 Weight

For GOES N, the nominal weights and tolerances of the sensor module, electronics module, and power supply module are shown in Table 3.2.1-1, exclusive of interconnect cables. *See Appendix 5.8.1, Table 5.8.1-1 for mass properties of GOES O/PQ Imagers.*

3.2.1.2 Moment of Inertia

The moments of inertia are calculated for two mission configurations: stowed and deployed. In the stowed configuration, the cooler cover on the sensor module is closed. In the deployed configuration, the cooler cover on the sensor module is open. For GOES N Imager, the calculated moments of inertia for the sensor assembly, electronics module, and power supply module, based upon the nominal weights and center of gravity locations, shall be as shown in Table 3.2.1-1. *See Appendix 5.8.1, Table 5.8.1-1 for mass properties of GOES O/PQ Imagers.*

3.2.1.3 Center of Gravity

For GOES N Imager, the nominal center of gravity locations for the sensor module, electronics module, and power supply module shall be as shown in Table 3.2.1-1. *See Appendix 5.8.1, Table 5.8.1-1 for mass properties of GOES O/PQ Imagers.* The sensor module center of gravity locations are shown for the two mission configurations (stowed and deployed) described in paragraph 3.2.1.2. All dimensions are with respect to the 0-0 mounting feet shown in the interface control drawings (8175756, 8175757, and 8175758).

TO:

3.2.1 Mass Properties

The typical weight, moment of inertia, and center of gravity for each of the three modules (with tolerances) shall be as shown in Table 3.2.1-1. The actual values for these parameters shall be supplied by the instrument contractor in the final data packages upon completion of the mass properties measurements for each specific instrument. Final data packages will be delivered with each sounder.

3.2.1.1 Weight

The nominal weights and tolerances of the sensor module, electronics module, and power supply module are shown in Table 3.2.1-1, exclusive of interconnect cables.

3.2.1.2 Moment of Inertia

The moments of inertia are calculated for two mission configurations: stowed and deployed. In the stowed configuration, the cooler cover on the sensor module is closed. In the

deployed configuration, the cooler cover on the sensor module is open. The calculated moments of inertia for the sensor assembly, electronics module, and power supply module, based upon the nominal weights and center of gravity locations, shall be as shown in Table 3.2.1-1.

3.2.1.3 Center of Gravity
The nominal center of gravity locations for the sensor module, electronics module, and power supply module shall be as shown in Table 3.2.1-1. The sensor module center of gravity locations are shown for the two mission configurations (stowed and deployed) described in paragraph 3.2.1.2. All dimensions are with respect to the 0-0 mounting feet shown in the interface control drawings (8175756, 8175757, and 8175758).

Move from Para 3.4.3.10 to page 2-1 prior to para 2.1

2. Applicable Documents
The following documents shall apply to the extent referenced herein. Unless otherwise specified the document revision in effect at the time of NOPQ contract start (13 February 1997) shall apply.

FROM:

3.4.1.2 Instrument Module Connectors
For GOES N Imager, Table 3.4.1-1 is a list of instrument module connectors. *See Appendix 5.8.2, Table 5.8.2-1 for a list of instrument module connectors for GOES O/PQ Imagers.* The locations of the interface connectors shall be as shown on the instrument module Interface Control Drawings. For GOES N Imager, the connector pin assignments shall be as given in Appendix 5.4 of this document. *For the GOES O/PQ Imagers, the spacecraft contractor shall use the keying and connector designations as shown in Appendix 5.8.2, Table 5.8.2-2.*

The spacecraft contractor shall provide a metallic outer shield on the instrument intra-module harness outside of the Faraday cage for electromagnetic interference (EMI) and electrostatic discharge (ESD) suppression. The spacecraft Faraday cage shall be the metallic outer shield for the instrument intra-module harness inside the Faraday cage. The spacecraft contractor shall provide the instrument's external harness with connector shells made from non-magnetic material with an electrically conductive finish. The spacecraft contractor shall terminate the external, intra-module harness shields to the connector bodies. Cadmium plating shall not be used. Connector contacts shall be gold plated. Silver plating shall not be used under the gold plating. For GOES N Imager, the spacecraft contractor shall accommodate the keying and harness connector designations shown in Table 3.4.1-1. *For the GOES O/PQ Imagers, the spacecraft contractor shall accommodate the keying and harness connectors designations as shown in Appendix 5.8.2, Table 5.8.2-1.*

3.4.1.3 Instrument Module Harness Interconnects

For GOES N Imager, the spacecraft design shall include the instrument module harness interconnects for the sensor module, electronics module, and power supply module as shown in Figure 3.4.1-3. *For the GOES O/PQ Imagers, the instrument module harness interconnects shall be as shown in Appendix 5.8.2, Figure 5.8.2-1.* The length of the harness cable shall not exceed the maximum cable lengths shown in Table 3.4.1-2. The engaging torque applied to the interconnect harness screw locks shall be 48 ±8 in-oz. For GOES N Imager, signals interfacing the sensor module, electronics module, and power supply module only (non-spacecraft interfaces) are included in Figure 3.4.1-3 and in Appendix 5.4, Instrument Wire List/Pin Assignments. *For the GOES O/PQ Imagers, signals interface the sensor, electronics, and power supply modules are included in Appendix 5.8.2, Figure 5.8.2-1 and in Appendix 5.10 GOES O/PQ Instrument Wire List/Pin Assignments.* This ICD does not provide detailed paragraphs, diagrams, or schematics for these interfaces. The Interface Control Drawings contain information on all connector markings and locations for each module. For GOES N Imager, Appendix 5.4 of this document contains signal names and pin assignments for all connectors. *For the GOES O/PQ Imagers, Appendix 5.10 of this document contains signal names and pin assignments for all connectors.*

3.4.1.4 Test Connectors

For GOES N Imager, the test points shown in Figure 3.4.1-4 shall be provided by the instrument contractor to facilitate testing and ensure conformance with the system specification. *For the GOES O/PQ Imagers, test points are shown in Appendix 5.8.2, figure 5.8.2-2. ...*

TO:

3.4.1.2 Instrument Module Connectors

Table 3.4.1-1 is a list of instrument module connectors. The locations of the interface connectors shall be as shown on the instrument module Interface Control Drawings. The connector pin assignments shall be as given in Appendix 5.4 of this document.

The spacecraft contractor shall provide a metallic outer shield on the instrument intra-module harness outside of the Faraday cage for electromagnetic interference (EMI) and electrostatic discharge (ESD) suppression. The spacecraft Faraday cage shall be the metallic outer shield for the instrument intra-module harness inside the Faraday cage. The spacecraft contractor shall provide the instrument's external harness with connector shells made from non-magnetic material with an electrically conductive finish. The spacecraft contractor shall terminate the external, intra-module harness shields to the connector bodies. Cadmium plating shall not be used. Connector contacts shall be gold plated. Silver plating shall not be used under the gold plating. The spacecraft contractor shall accommodate the keying and harness connector designations shown in Table 3.4.1-1.

3.4.1.3 Instrument Module Harness Interconnects

The spacecraft design shall include the instrument module harness interconnects for the sensor module, electronics module, and power supply module as shown in Figure 3.4.1-3. The length of the harness cable shall not exceed the maximum cable lengths shown in Table 3.4.1-2. The engaging torque applied to the interconnect harness screw locks shall be 48 ±8

in-oz. Signals interfacing the sensor module, electronics module, and power supply module only (non-spacecraft interfaces) are included in Figure 3.4.1-3 and in Appendix 5.4, Instrument Wire List/Pin Assignments. This ICD does not provide detailed paragraphs, diagrams, or schematics for these interfaces. The Interface Control Drawings contain information on all connector markings and locations for each module. Appendix 5.4 of this document contains signal names and pin assignments for all connectors.

3.4.1.4 Test Connectors

The test points shown in Figure 3.4.1-4 shall be provided by the instrument contractor to facilitate testing and ensure conformance with the system specification. ...

Changes to SXI ICD (DS80667-H00-011)

9. Make the following changes to Attachment E – GOES N-P Solar X-Ray Imager (DS80667-H00-011).

Reference CCR's 6381A, 6392C & 6402A

Description of the Changes:

FROM: Para 2.1 – delete the following applicable document

MIL-P-27401	Propellant, Pressurizing Agent, Nitrogen, Rev C

TO:

~~MIL-P-27401~~	~~Propellant, Pressurizing Agent, Nitrogen, Rev C~~

FROM Para 2.2.2 – Add the following referenced documents

Document	Title
S-415-17	Performance Requirements Document for the GOES-NO/PQ Solar X-Ray Imager (SXI), Revision B
S-415-22	Performance Specification for Geostationary Operational Environmental Satellite
GSFC X-900-004	Charged Particle Radiation Exposure of Geostationary Orbits (Stassinipoulos, Barth and Nakamura 1997)

ASTM-E595-90	Total Mass Loss and Collected Volatile Condensable Materials from Outgassing in Vacuum Environment
EIA-422	Electrical Characteristics of Balanced Voltage Digital Interface Circuits

TO: Para 2.2.2 – Add the following referenced documents

Document	Title
S-415-17	Performance Requirements Document for the GOES-NO/PQ Solar X-Ray Imager (SXI), Revision B
S-415-18	GOES Solar X-Ray Imager (SXI) Interface Control Document (ICD)
S-415-22	Performance Specification for Geostationary Operational Environmental Satellite
S-415-25	GOES N-Q Spacecraft Interface Control Document (ICD)
GSFC X-900-004	Charged Particle Radiation Exposure of Geostationary Orbits (Stassinipoulos, Barth and Nakamura 1997)
ASTM-E595-90	Total Mass Loss and Collected Volatile Condensable Materials from Outgassing in Vacuum Environment
EIA-422	Electrical Characteristics of Balanced Voltage Digital Interface Circuits
LMATC 2A08999	CEB Mask Light Shield MLI Blanket Installation
LMATC 2A09000A	Thermal Blanket, CEB Light Shield

FROM:

SXI3.3.2.4-3
The Spacecraft contractor provided SXI external cables and harnesses shall comply with LMATC 2A06603.

SXI3.4.1.3-1
The SXI shall be capable of surviving the following environments during tests or launch. Unless noted otherwise, the environments specified are at the mounting interface.

SXI3.4.5.4.2-1
Bilevel digital data outputs shall have the following characteristics in Table 3-22 as measured at the SXI interface connector.

TO:

SXI3.3.2.4-3
The Spacecraft contractor provided SXI external cables and harnesses shall comply with LMATC 2A06603. External cables and harnesses will also comply with GSFC X-900-004.

SXI3.4.1.3-1
The SXI shall be capable of surviving the following environments during tests or launch. Unless noted otherwise, the environments specified are at the mounting interface, and were created referencing the *Spacecraft/Launch Vehicle Interface Requirements Document (HS601AB-0265).*

SXI3.4.5.4.2-1
Bilevel digital data outputs shall have the following characteristics in Table 3-22 as measured at the SXI interface connector. These characteristics were defined using document *Electrical Characteristics of Balanced Voltage Digital Interface Circuits (EIA-422).*

Change Table 3-20 as follows:

FROM:

Table 3-20. Main Power Bus Transients

Transient Event	Transient Duration (msec)	Transient Voltage (V)
Turn-on of unit	≤3	39.5 min
Turn-off of unit	≤3	43.5 max

TO:

Table 3-20. Main Power Bus Transients

Transient Event	Transient Duration (milliseconds)	Transient Voltage (V)
Turn-on of unit (applies only to transients commencing at and completing within 0.010 miliseconds of unit turn-on) (relay "close")	<= 0.010	65.6 max
Turn-on of unit	> 0.010 <= 3	39.5 min
Turn-off of unit	<= 3	43.5 max

Change para 3.4.5.1.1-1

FROM:
Under all transient conditions, no greater than 180 msec, the instantaneous S/C bus voltage shall remain within the limits of 39.5 to 46.0 V.

TO:
For transient conditions occurring between 3 and 180 msec after unit turn-on or turn-off, the instantaneous S/C bus voltage shall remain within the limits of 39.5 to 46.0 V. For transient conditions occurring within 3 msec of unit turn-on or turn-off, bus voltages shall be as specified in Table 3-20.

Waivers to SXI ICD (DS80667-H00-011)

10. Incorporate the following waivers to Attachment E – GOES N-P Solar X-Ray Imager ICD (DS80667-H00-011).

Description of Waivers:

a. Waiver W6928: As documented in CCR 8056; waiver of SXI FM-2 performance during generic Mil-Std EMI/EMC verification tests.

11. **Make the following changes to Clause J-1 List of Attachments of the contract as follows:**

a. Revise Attachment O to incorporate Revision B dated 6/30/2005.
b. Revise Attachment C to incorporate Revision H dated 3/7/2006.
c. Revise Attachment D to incorporate Revision H dated 3/7/2006.
d. Revise Attachment E to incorporate Revision F dated 3/7/2006.

12. Replace Section J, List of Attachments with the attached (Attachment 1) Section J. This revised Section J incorporates the changes documented in Item xx above.

13. The following CCR's are added to this contract by reference: CCR's 4399, 6275A, 6277A, 6279A, 6283A, 6285A, 6371C, 6375, 6376, 6377B, 6378, 6379A, 6380, 6381, 6385A, 6386B, 6387A, 6392C, 6399A, 6401B, 6402A, 6403, 7965A, 7093A, 7102A, 8056.

The fixed price of this contract and the funds allotted for the performance thereof, shall not be deemed to be increased by this modification. In consideration of the modifications, including, but not limited to, all waivers, deviations, and Government provided accommodations, agreed to herein as complete and equitable adjustments for all work required by this modification and Configuration Change Requests (CCR's) referenced herein, and as being technically equivalent under Clause H.15 of the contract. The contractor hereby releases the Government from any and all liability under this contract for further equitable adjustments attributed to such facts and circumstances giving rise to this modification and the CCR's referenced herein.

End of Modification 120

NAS5-98069

Attachment 1

J.1 LIST OF ATTACHMENTS (GSFC 52.210-101) (OCT 1988)

The following attachments constitute part of this contract:

Attachment	Document No.	Description	Date
A	**415-23**	**Statement of Work**	**August 26, 1997**
	Revised – Mod 03		05-11-1998
	Revised – Mod 07		08-06-1998
	Revised – Mod 09		08-27-1998
	Revised – Mod 12		10-13-1998
	Revised – Mod 13		11-23-1998
	Revised – Mod 16		02-24-1999
	Revised – Mod 19		02-12-1999
	Revised – Mod 24		06-25-1999
	Revised – Mod 28		10-12-1999
	Revised – Mod 29		10-12-1999
	Revised – Mod 32		03-15-2000
	Revised – Mod 34		04-10-2000
	Revised – Mod 36		05-16-2000
	Revised – Mod 40		07-28-2000
	Revised – Mod 43		11-30-2000
	Revised – Mod 49		03-15-2001
	Revised – Mod 53		01-15-2002
	Revised – Mod 59		12-10-2001
	Revised – Mod 62		02-21-2002
	Revised – Mod 67		04-25-2002
	Revised – Mod 73		10-24-2002
	Revised – Mod 85		07-12-2003
	Revised – Mod 88		08-27-2003
	Revised – Mod 95		06-18-2003
	Revised – Mod 96 (Horse Trade 22)		09-27-2004
	Revised – Mod 97 (Horse Trade 23)		09-27-2004
	Revised – Mod 102 (Horse Trade 24.25.26)		Open
B	**415-22**	**Performance Specification**	**August 26, 1997**
	Revised – Mod 05		04-11-1998
	Revised – Mod 06		06-23-1998
	Revised – Mod 07		08-06-1998
	Revised – Mod 09		08-27-1998
	Revised – Mod 11		10-08-1998
	Revised – Mod 13		11-23-1998
	Revised – Mod 16		02-24-1999
	Revised – Mod 19		03-12-1999
	Revised – Mod 24		06-25-1999
	Revised – Mod 28		10-12-1999
	Revised – Mod 32		03-15-2000
	Revised – Mod 36		05-16-2000
	Revised – Mod 37		05-25-2000
	Revised – Mod 40		07-28-2000
	Revised – Mod 41		11-14-2000
	Revised – Mod 43		11-30-2000

	Revised – Mod 49		03-15-2001
	Revised – Mod 51		05-24-2001
	Revised – Mod 59		12-10-2001
	Revised – Mod 62		02-21-2002
	Revised – Mod 64		06-10-2002
	Revised – Mod 69		06-16-2002
	Revised – Mod 85		07-12-2003
	Revised – Mod 88		08-27-2003
	Revised – Mod 95		06-18-2003
	Revised – Mod 96	(Horse Trade 22)	09-27-2004
	Revised – Mod 97	(Horse Trade 23)	09-27-2004
	Revised – Mod 102	(Horse Trade 24.25.26)	Open
Appendix A	**S-415-22(A)**	**Deviation & Wavier Requests**	**02-24-1998**
	Revised – Mod 16		02-24-1999
	Revised – Mod 24		06-25-1999
	Revised – Mod 32		03-15-2000
	Revised – Mod 36		05-16-2000
	Revised – Mod 40		07-28-2000
	Revised – Mod 41		11-14-2000
	Revised – Mod 48		04-25-2001
	Revised – Mod 51		05-24-2001
	Revised – Mod 53		01-15-2002
	Revised – Mod 62		02-21-2002
	Revised – Mod 69		06-16-2002
	Revised – Mod 88		08-27-2003
	Revised – Mod 96	(Horse Trade 22)	09-27-2004
	Revised – Mod 97	(Horse Trade 23)	09-27-2004
Appendix B	**S-415-22(B)**	**Component EMI/EMC Test**	
	Revised – Mod 40		07-28-2000
	Revised – Mod 43		11-30-2000
Appendix C	**S-415-22(C)**	**Exemptions to Reference Docs.**	05-16-2000
C	**DS80067-H00-010**	**GOES-N-Q Imager Interface Control Document**	**Revision H**
	Revised – Mod 11	(Revision C)	10-07-1998
	Revised – Mod 19		03-12-1999
	Revised – Mod 26		07-29-1999
	Revised – Mod 29		10-12-1999
	Revised – Mod 31		11-29-1999
	Revised – Mod 32	(Revision D)	03-15-2000
	Revised – Mod 36		05-16-2000
	Revised – Mod 37		05-25-2000
	Revised – Mod 41		11-14-2000

Revised – Mod 43		11-30-2000
Revised – Mod 48		04-25-2001
Revised – Mod 51		05-24-2001
Revised – Mod 53	(Revision F)	01-15-2002
Revised – Mod 62		02-21-2002
Revised – Mod 69		06-16-2002
Revised – Mod 88	(Revision G)	08-27-2003
Revised – Mod 96	(Horse Trade 22)	09-27-2004
Revised – Mod 97	(Horse Trade 23)	09-27-2004
Revised – Mod 102	(Horse Trade 24,25,26)	Open

D	**DS80067-H00-012**	**N-Q Sounder Instrument Interface Control Document**	**Revision H**

Revised – Mod 11	(Revision C)	10-07-1998
Revised – Mod 19		03-12-1999
Revised – Mod 26		07-29-1999
Revised – Mod 29		10-12-1999
Revised – Mod 31		11-29-1999
Revised – Mod 32	(Revision D)	03-15-2000
Revised – Mod 36		05-16-2000
Revised – Mod 37		05-25-2000
Revised – Mod 41		11-14-2000
Revised – Mod 43		11-30-2000
Revised – Mod 48		04-25-2001
Revised – Mod 51		05-24-2001
Revised – Mod 53	(Revision F)	01-15-2002
Revised – Mod 62		02-21-2002
Revised – Mod 69		06-16-2002
Revised – Mod 88	(Revision G)	08-27-2003
Revised – Mod 96	(Horse Trade 22)	09-27-2004
Revised – Mod 97	(Horse Trade 23)	09-27-2004
Revised – Mod 102	(Horse Trade 24,25,26)	Open

E	**DS80067-H00-011**	**Interface Control Document for The Solar X-Ray Imager (SXI)**	**Revision F**

Revised – Mod 19	03-12-1999
Revised – Mod 25	06-25-1999
Revised – Mod 28	10-12-1999
Revised – Mod 29	10-12-1999
Revised – Mod 31	11-29-1999
Revised – Mod 32	03-15-2000
Revised – Mod 33	03-15-2000
Revised – Mod 34	04-10-2000
Revised – Mod 36	05-16-2000
Revised – Mod 37	05-25-2000
Revised – Mod 40	07-28-2000
Revised – Mod 41 (Revision A)	11-14-2000
Revised – Mod 43	11-30-2000
Revised – Mod 48	04-25-2001

	Revised – Mod 51 (Revision B)		05-24-2001
	Revised – Mod 53 (Revision C)		01-15-2002
	Revised – Mod 62		02-21-2002
	Revised – Mod 69		06-16-2002
	Revised – Mod 88 (Revision E)		08-27-2003
	Revised – Mod 96 (Horse Trade 22)		09-27-2004
	Revised – Mod 97 (Horse Trade 23)		09-27-2004
F	**RESERVED**		
G	**415-26**	**Contract Document Requirements List**	**August 26, 1997**
	Revised – Mod 07		08-16-1998
	Revised – Mod 09		08-27-1998
	Revised – Mod 12		10-13-1998
	Revised – Mod 21		05-06-1999
	Revised – Mod 24		06-25-1999
	Revised – Mod 43		11-30-2000
	Revised – Mod 49		03-15-2001
	Revised – Mod 62		02-21-2002
	Revised – Mod 85		07-12-2003
	Revised – Mod 102 (Horse Trade 24.25.26)		Open
H		**Government Furnished Property**	**June 2004**
	Revised – Mod 07		08-16-1998
	Revised – Mod 12		10-13-1998
	Revised – Mod 19		03-12-1999
	Revised – Mod 24		06-25-1999
	Revised – Mod 33		03-15-2000
	Revised – Mod 36		05-16-2000
	Revised – Mod 40		07-28-2000
	Revised – Mod 59		12-10-2001
	Revised – Mod 95		06-18-2003
	Revised – Mod 102 (Horse Trade 24.25.26)		Open
I	**415-27**	**Program Review Requirements**	**August 26, 1997**
	Revised – Mod 03		05-11-1998
	Revised – Mod 12		10-13-1998
	Revised – Mod 21		05-06-1999
	Revised – Mod 49		03-15-2001
	Revised – Mod 85		07-12-2003

J		**Small, Small Disadvantaged and Women-Owned Small Business Subcontracting Plan**	**January 12, 1998**
	Revised – Mod 49	(Revision 1,Plan # SC97-04-D)	03-15-2001
	Revised – Mod 59	(Revision 2 Plan #SC97-04-E)	12-10-2001
	Revised – Mod 67	(Revision 3 Plan #SC97-04-F)	04-25-2002
	Revised – Mod 86	(Revision 5 Plan #SC97-04-H)	07-29-2003
	Revised – Mod 98	(Revision 6 Plan #SC97-04-I)	07-19-2004
K		**Performance Based Payments Completion Criteria**	**January 12, 1998**
	Revised – Mod 03		05-11-1998
	Revised – Mod 12	(Revision A)	10-13-1998
	Revised – Mod 21		05-06-1999
	Revised – Mod 26		07-29-1999
	Revised – Mod 28		10-12-1999
	Revised – Mod 35		03-13-2000
	Revised – Mod 38		05-18-2000
	Revised – Mod 47		11-20-2000
	Revised – Mod 49		03-15-2001
	Revised – Mod 55		07-09-2001
	Revised – Mod 57		08-15-2001
	Revised – Mod 58		11-13-2001
	Revised – Mod 59		12-10-2001
	Revised – Mod 60		12-07-2001
	Revised – Mod 65		04-08-2002
	Revised – Mod 67		04-25-2002
	Revised – Mod 71		08-06-2002
	Revised – Mod 73		10-24-2002
	Revised – Mod 77		01-29-2003
	Revised – Mod 78		02-14-2003
	Revised – Mod 84		11-20-2003
	Revised – Mod 85		07-12-2003
	Revised – Mod 95		06-18-2003
		Performance Based Payments Completion Criteria (Contractor Provided Milestones)	**Revision A 09-10-1998**
	Revised – Mod 13		11-23-1998
	Revised – Mod 18		02-08-1999

L	**DS80067-H00-013**	**Interface Control Document for the Solar X-Ray Imager Ground Support Equipment and Hughes GOES Satellite (N,O,P,Q)**	**September 09,1999**
		Integration and Test	
	Revised – Mod 34		04-10-2000
	Revised – Mod 48		04-25-2001
	Revised – Mod 51 (Revision B)		05-24-2001
	Revised – Mod 53		01-15-2002
	Revised – Mod 62		02-21-2002
	Revised – Mod 69		06-16-2002
	Revised – Mod 88 (Revision C)		08-27-2003
M		**GOES P Components (formerly GOES N/O Spares)**	**October 2001**
	Revised – Mod 59		12-10-2001
	Revised – Mod 78		02-14-2003
N		**Performance Based Payments for Clause H.24**	**December 10, 2001**
	Revised – Mod 59		12-10-2001
O	**DS80067-H00-014**	**Interface Control Document For Imager &Sounder Test Equipment and the N-Q Space- Craft Ground Support Equipment / Facilities And Spacecraft Launch Facilities (GSE-ICD)**	
	Revised – Mod 120 (Revision B)		6-30-2005

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF 3 PAGES

2. AMENDMENT/MODIFICATION NO. 121

3. EFFECTIVE DATE See block 16C

4. REQUISITION/PURCHASE REQ. NO. 4200137885

5. PROJECT NO. (If applicable) GOES N

6. ISSUED BY CODE 210.Y
NASA/Goddard Space Flight Center
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE
NASA Goddard Space Flight Center
Code 210.7
Greenbelt, MD 20771

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)
Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required) Amt: $0
N/A

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: Clause C.2 Special Task Assignments and Reports

D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor is not, XXX is required to sign this document and return _4___ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This modification increases the contract price by $369,856 based upon the completion of Task Assignments 64, 138, 139, 140, 141, 147, 148, 149, 150 and 161.

CCR: 4413

Accordingly,

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)
Mr. Scott Ingersoll
Manager NASA Contracts BSS

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
Glenn Stewart

15B. CONTRACTOR/OFFEROR
Scott Ingersoll
(Signature of person authorized to sign)

15C. DATE SIGNED
November 30, 2005

16B. UNITED STATES OF AMERICA
BY Glenn Stewart
(Signature of Contracting Officer)

16C. DATE SIGNED
12/5/05

1. The contract price is increased based on the completion of the following Task Assignments:

	Hours	Dollars
TA 64 – Test Procedure Updates for Engineering Analysis	90	$15,158
TA 138 – GOES N Heat Pipe Testing	271	50,008
TA 139 – GOES N SAD 360 Rotation Test	16	2,789
TA 140 – GOES O WFC #2 Test	265	50,927
TA 141 – EMWIN Compatibility Testing	25	4,615
TA147 – SSGS Build 9 Launch Configuration Review	471	87,080
TA 148 – GOES O SXI Removal and Ship	127	23,122
TA 149 – NTACTS Move & MRS&S rack change	30	27,483
TA 150 – GOES N, O SXI Eboxes access removal assessment	493	91,512
TA 161 – SSGS Support for SXI EGS	32	17,163
	1,820	$369,856

2. Revise Clause B.1 Deliverable Requirements, Contract Line Item Number 0012 – Special Task Assignments with reports as follows:

From: $6,755,494 (Modification 104)
By: $ 369,856
To: $7,125,350 (Modification 121)

3. Increase The Price of Clause B.2, Firm Fixed Price as Follows:

From: $728,922,719
By: 369,856
To: $729,292,575

4. Clause C.2, Special Task Assignments and Reports, Revise item 1 – Level of Effort Required to Accomplish Work to include the following:

a. The price of CLIN 12 (To be added to Clause B.2) is hereby adjusted:

From: $6,755,494 By: $369,856 To: $7,125,350

The remaining direct labor hours as follows:

From: 225,584 By: -1,820 To 223,764

5. Replace the contract areas listed above with the enclosed revised pages:

The contractor hereby releases the Government from any and all liability under this contract for further adjustments attributed to such facts or circumstances giving rise by these task assignments listed in this modification.

END OF MODIFICATION 121

11a.	One set of GOES P Components as listed in Attachment M (formerly N/O Spares)	$49,500,000
11b	Additional Ground Support Special Test Equipment (Mod 73)	NSP
12.	Special Task Assignments with Reports	$ 7,125,350 See Clause B.9
13.	Additional Integration & Testing Support	$534,000 See Clause H.4
14.	Spacecraft Storage	See Clause H.4
OPTION 1 15.	On-Orbit Acceptance of	$136,447,938 GOES P Spacecraft
16	RESERVED	
17	Additional Integration &	See Clause H.4 Testing Support
18	Spacecraft Storage	See Clause H.4

Total value of each CLIN, for purposes of final payment shall be reduced by Performance Based Payments made to the contractor for that CLIN.

(End of clause)

B.2 FIRM FIXED PRICE (18-52.216-78) (DEC 1988)

The total firm fixed price for this contract is $729,292,575.

(End of clause)

B.3 RESERVED

The price of CLIN 12 (included in Clause B.2) is hereby adjusted:

FROM: $6,755,494 **BY:** $369,856 **TO:** $7,125,350

The remaining direct labor hours are as follows:

FROM: 225,584 **BY:** -1,820 **TO:** 223,764

2. Task Assignments and Reports

Task assignments will be issued unilaterally by the Contracting Officer to the Contractor designating the tasks to be performed, the schedule of performance, and any materials, travel, etc., known to be required. Such assignments will be issued on GSFC Form 18-45 "Task Assignment" or other appropriate form. Task assignments will be numbered consecutively. Task assignments may be modified by issuance of a subsequent form which cites the existing task assignment number followed by an alpha designation indicating the applicable revision sequence.

For each task assignment, the Contractor shall submit a one time Contractor Task Report. This report is the Contractor's resources plan for accomplishing the work described in each task assignment and shall be submitted within 10 calendar days, or a different time frame if acceptable by the Contracting Officer, after issuance of each task assignment. The Contractor shall commence work on the task assignment upon receiving written authorization from the Contracting Officer which will occur after an agreement of all costs is reached as described in the CTR.

The task report shall be the Contractor's overall estimate for the completion of the task assignment and shall include the following:

a. Date of task assignment;

b. Direct labor hours (including overtime), by month, price per hours;

c. Detailed travel and material estimates;

d. Price associated with subcontractors reflecting the above information;

e. A technical summary of the Contractor's understanding of the task; and

f. Any information found to be pertinent, such as interdivisional purchases, consultants, etc.

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF PAGES 2

2. AMENDMENT/MODIFICATION NO. 122

3. EFFECTIVE DATE 12/14/05

4. REQUISITION/PURCHASE REQ. NO. 4200117833

5. PROJECT NO. (If applicable) GOES N

6. ISSUED BY CODE 210.7

NASA/Goddard Space Flight Center
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE

NASA Goddard Space Flight Center
Code 210.7
Greenbelt, MD 20771

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)

Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

N/A Amt: $0

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: Changes Clause 52.243-1 Alt. II

D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor is not, XXX is required to sign this document and return _4___copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This un-priced supplemental agreement increases the not-to-exceed price of Modification 110 by $99,355 to permit continued long lead efforts in support of revised specifications for the EUV instrument.

Accordingly,

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)
Mr. Scott Ingersoll
Manager, NASA Contracts, BSS

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
Glenn Stewart

15B. CONTRACTOR/OFFEROR
Scott D. Ingersoll
(Signature of person authorized to sign)

15C. DATE SIGNED December 15, 2005

16B. UNITED STATES OF AMERICA
BY Glenn Stewart
(Signature of Contracting Officer)

16C. DATE SIGNED 12/16/05

a. The not-to-exceed price agreed to in Modification 110 is increased from $437,077 by $99,355 to $536,432.

CONTRACTOR'S STATEMENT OF RELEASE

Any claim for increased price or allotment of funds resulting from this change must be asserted in accordance with the terms of the Changes clause of this contract and this modification. Until modification is made, as a result of such assertion, the Contractor is not obligated to continue performance or incur costs beyond the point established in the contract clause entitled "Limitation of Funds." A not-to-exceed price of $536,432 is set for the effort directed by Modification 110. The contractor hereby releases the Government from any and all liability for fee arising from estimated costs for this effort that exceed $536,432. Costs of this changed effort shall be separately accounted for the duration of this effort.

End of Modification

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF 2 PAGES

2. AMENDMENT/MODIFICATION NO. 123

3. EFFECTIVE DATE See Blk 16

4. REQUISITION/PURCHASE REQ. NO. N/A

5. PROJECT NO. (If applicable) GOES O

6. ISSUED BY CODE 210.Y

NASA/Goddard Space Flight Center
Bldg 6, Room W246
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE

NASA Goddard Space Flight Center
Code 210.7
Greenbelt, MD 20771

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)

Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

N/A Amt: $0.00

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

X D. OTHER Specify type of modification and authority) Clause H.4--Additional Goverment. Accommodations

E. IMPORTANT: Contractor XXX is not, is required to sign this document and return ____copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

The purpose of this modification is to revise the Engineering Handover Date identified in clause F. 2 for the GOES O and P Spacecraft.

Accordingly:

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Glenn Stewart

15B. CONTRACTOR/OFFEROR

(Signature of person authorized to sign)

15C. DATE SIGNED

16B. UNITED STATES OF AMERICA

BY (Signature of Contracting Officer)

16C. DATE SIGNED 1/19/06

NSN 7540-01-152-8070
PREVIOUS EDITION UNUSABLE

30-105
Computer Generated

STANDARD FORM 30 (REV. 10-83)
Prescribed by GSA
FAR (48 CFR) 53.243

1. In accordance with Clause H.4—Additional Government Accommodations, paragraph (g) of contract NAS 5-98069, the Contractor (BSS) is hereby notified of a revision to the Engineering Handover Date (EHD) for the GOES O and P Spacecraft. This notification serves to fulfill the Government's contractual obligation to amend the contract via modification and to notify the contractor (BSS) of a revised EHD 18 months in advance of the current Engineering Handover Date.

As stated in Clause F.2 of contract NAS 5-98069, the Engineering Handover for GOES O is hereby changed from April 30, 2007 to July 30, 2007and the Engineering Handover for GOES P is hereby changed from January 31, 2008 to April 2008.

2. Replace page F-3 with the enclosed revised F-3 change page.

The fixed Price of this contract and the funds allotted for the performance thereof shall not be deemed to be increased by the modification. This modification also represents a complete and equitable settlement for the work associated with this change and releases the Government from any and all liability under this contract for further equitable adjustment attributed to such facts and circumstances giving rise by this modification, except as provided for in Clause H.4(g).

End of Modification

F.2 ENGINEERING HANDOVER DATES AND STORAGE DATES

The following dates are defined as the engineering handover dates and the earliest dates at which the spacecraft may be placed into ground storage:

	Earliest Ground Storage Date	Engineering Handover Date
GOES N	January 1, 2002	December 31, 2004
GOES O	January 1, 2003	July 30, 2007
GOES P	January 1, 2005	April 30, 2008

The contractor shall place each GOES spacecraft or replacement spacecraft into storage, if required, at the contractor's facility immediately following successful completion of spacecraft Integration and Test (I&T) (including integration and test of the delivered GFE instruments) and successful completion of the pre-storage review, but no earlier than the dates specified for Earliest Storage Date (ESD). No storage charges, as defined in Clause H.4, shall be paid prior to the ESD or for any storage resulting from delays in the Contractor-provided launch.

(End of clause)

F.3 SECTION F CLAUSES INCORPORATED BY REFERENCE

(52.242-15) STOP-WORK ORDER (AUG 1989)
(52.247-34) F.O.B. DESTINATION (NOV 1991)

(End of By Reference Section)

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF PAGES 2

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable)
124	See Blk 16	4200146040	GOES N-P

6. ISSUED BY CODE 210.Y
NASA/Goddard Space Flight Center
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE
NASA Goddard Space Flight Center
Code 210.7
Greenbelt, MD 20771

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)
Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
See page 2 Amt:$0

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
52.232-18 – "Availability of Funds"

D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor X is not, is required to sign this document and return ____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

The purpose of the modification is to provide an additional $6,900,000 in funding.

Accordingly,

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
		Glenn Stewart	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
(Signature of person authorized to sign)		BY (Signature of Contracting Officer)	2/17/06

1. Revise Clause H.6, Limitation of funds as Follows:

From:	$694,635,868	(Mod 116)
By:	6,900,000	
To:	$701,535,868	(Mod 124)

2. Revise Clause H.6, paragraph (c) (1) from March 2008 to June 30, 2008

Accounting and Appropriation Data:

Purchase Requisition No. 4200146040

3. Replace page H-7 with the attached page H-7.

End of Modification

e. Subcontractor Reporting

FAR clause 52.219-9 and NASA FAR Supplement clause 18-52.219-75 require that the Contractor ensure that SF 294 and SF 295 reports are submitted by those subcontractors that have been required to adopt a Subcontracting Plan under the terms of the clause. These subcontractor reports must be submitted as required by paragraphs (c) and (d) above. The reports may be submitted through the Contractor or submitted directly. Regardless, the Contractor is responsible for ensuring proper and timely submittal of the required reports.

(End of clause)

H.6 LIMITATION OF FUNDS (FIXED-PRICE CONTRACT) (18-52.232-77) (MAR 1989)

(a) The sum of $701,535,868.00 (Mod 124) is presently available for payment and allotted to this contract. It is anticipated that from time to time additional funds will be allocated to the contract in accordance with the following schedule, until the total price of said item is allotted:

SCHEDULE FOR ALLOTMENT OF FUNDS

Date	Amounts
September 21, 2004	$38,000,000.00

(b) The Contractor agrees to perform or have performed work on the items specified in paragraph (a) above up to the point at which, if this contract is terminated pursuant to the Termination for Convenience of the Government clause of this contract, the total amount payable by the Government (including amounts payable for subcontracts and settlement costs) pursuant to paragraphs (f) and (g) of that clause would, in the exercise of reasonable judgment by the Contractor, approximate the total amount at the time allotted to the contract. The Contractor is not obligated to continue performance of the work beyond that point. The Government is not obligated in any event to pay or reimburse the Contractor more than the amount from time to time allotted to the contract, anything to the contrary in the Termination for Convenience of the Government clause notwithstanding.

(c)(1)It is contemplated that funds presently allotted to this contract will cover the work to be performed until June 30, 2008.

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE	OF	PAGES
	1		2

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable)
125	See Blk 16	4200148873	GOES N-P

6. ISSUED BY CODE 210.Y
NASA/Goddard Space Flight Center
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE
NASA Goddard Space Flight Center
Code 210.7
Greenbelt, MD 20771

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)
Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
See page 2 Amt:$0

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
52.232-18 – "Availability of Funds"

D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor X is not, is required to sign this document and return ____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

The purpose of the modification is to provide an additional $5,000,000 in funding.

Accordingly,

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
		Glenn Stewart	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
(Signature of person authorized to sign)		BY (Signature of Contracting Officer)	3/13/06

1. Revise Clause H.6, Limitation of funds as Follows:

From:	$701,535,868	(Mod 124)
By:	5,000,000	
To:	$706,535,868	(Mod 125)

2. Replace page H-7 with the attached page H-7.

End of Modification

e. Subcontractor Reporting

FAR clause 52.219-9 and NASA FAR Supplement clause 18-52.219-75 require that the Contractor ensure that SF 294 and SF 295 reports are submitted by those subcontractors that have been required to adopt a Subcontracting Plan under the terms of the clause. These subcontractor reports must be submitted as required by paragraphs (c) and (d) above. The reports may be submitted through the Contractor or submitted directly. Regardless, the Contractor is responsible for ensuring proper and timely submittal of the required reports.

(End of clause)

H.6 LIMITATION OF FUNDS (FIXED-PRICE CONTRACT) (18-52.232-77) (MAR 1989)

(a) The sum of $706,535,868.00 (Mod 125) is presently available for payment and allotted to this contract. It is anticipated that from time to time additional funds will be allocated to the contract in accordance with the following schedule, until the total price of said item is allotted:

SCHEDULE FOR ALLOTMENT OF FUNDS

Date	Amounts
September 21, 2004	$38,000,000.00

(b) The Contractor agrees to perform or have performed work on the items specified in paragraph (a) above up to the point at which, if this contract is terminated pursuant to the Termination for Convenience of the Government clause of this contract, the total amount payable by the Government (including amounts payable for subcontracts and settlement costs) pursuant to paragraphs (f) and (g) of that clause would, in the exercise of reasonable judgment by the Contractor, approximate the total amount at the time allotted to the contract. The Contractor is not obligated to continue performance of the work beyond that point. The Government is not obligated in any event to pay or reimburse the Contractor more than the amount from time to time allotted to the contract, anything to the contrary in the Termination for Convenience of the Government clause notwithstanding.

(c)(1)It is contemplated that funds presently allotted to this contract will cover the work to be performed until June 30, 2008.

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

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2. AMENDMENT/MODIFICATION NO. 126

3. EFFECTIVE DATE See block 16C

4. REQUISITION/PURCHASE REQ. NO. n/a

5. PROJECT NO. (If applicable) GOES N

6. ISSUED BY CODE 210.Y
NASA/Goddard Space Flight Center
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE
NASA Goddard Space Flight Center
Code 210.7
Greenbelt, MD 20771

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)
Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
N/A Amt: $0

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: Clause 52.243-1 Alt.II

D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor is not, XXX is required to sign this document and return _4___ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This supplemental agreement incorporates waivers and deviations to the Performance Specification and waivers and updates to Interface Control Documents contained in CCR's 4409, 4410A, 4411A, 6389A, 6390A, 6400, 6405, 7072B, 7109, 7110, 7111, 7112, 7113, 7114, 7115, 7119, 7120A and 7121A.

Accordingly,

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)
Mr. Scott Ingersoll
Manager, NASA Contracts, BSS

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
Glenn Stewart

15B. CONTRACTOR/OFFEROR
(Signature of person authorized to sign)

15C. DATE SIGNED June 13, 2006

16B. UNITED STATES OF AMERICA
BY (Signature of Contracting Officer)

16C. DATE SIGNED 6/23/06

Waivers and Deviations to Performance Specification (S-415-22)

1. Incorporate the following waiver to Attachment B – GOES N-P Performance Specification (S-415-22)

Description of the Waiver:

a. Waiver W6939: Waiver to the out-of-band SAR NTIA/ITU spurious emissions for GOES P as documented in CCR 6400;

FROM:

10.2.1.10.2.2 SAR Downlink Out-of-Band Emissions in Accordance with ITU Recommendations

The out of band spurious emission envelope of the SAR down-link signal shall comply with the requirements indicated in Figure 10.2.1.10.2.2-2, when subjected to a total received incident power not greater than –132 dBmi within the frequency band from 406.01 to 406.05 MHz. This requirement is based on the ITU Recommendations. The Figure 10.2.1.10.2.2-2 is for the OOB emissions at absolute offset frequency from the carrier frequency. A two-sided symmetric mask about the carrier frequency shall be used for OOB emissions for positive and negative offset frequencies, although only the positive offset frequencies are shown in the figure.

TO:

10.2.1.10.2.2 SAR Downlink Out-of-Band Spurious Emissions in Accordance with ITU Recommendations

The out of band spurious emission envelope of the SAR down-link signal shall comply with the requirements indicated in Figure 10.2.1.10.2.2-2, when subjected to a total received incident power not greater than –132 dBmi within the frequency band from 406.01 to 406.05 MHz. This requirement is based on the ITU Recommendations. The Figure 10.2.1.10.2.2-2 is for the OOB emissions at absolute offset frequency from the carrier frequency. A two-sided symmetric mask about the carrier frequency shall be used for OOB emissions for positive and negative offset frequencies, although only the positive offset frequencies are shown in the figure. **(MOD 69, CCR 6176A) NOTE: Refer to CCR6262 & CCR6272B Mod105; CCR6400, Mod 126 (Deviation and Waiver (RDW) Summary) in Appendix A**

b. Deviation from the requirement that the communications subsystem channels shall be compliant with the spurious requirements in section 10.2.1.12 over all spacecraft subsystem on-orbit configuration as documented in CCR 6389A:

FROM:

8.4.10 RF Airlink Test
The spacecraft contractor shall establish a simulated on-orbit RF environment to determine subsystem electromagnetic compatibility with the spacecraft in an on-orbit configuration. The spacecraft antennas shall be connected for free space radiation and shall receive uplink signals. The communication subsystem transmission channels shall be accessed with mission signals described in section 10.2 and its subsections. The spacecraft subsystems shall be configured for on-orbit operation and undergo parametric monitoring for electromagnetic susceptibility. The communication subsystem channels shall be compliant with the spurious requirements in section 10.2.1.12 over all spacecraft subsystem on-orbit configurations. The spacecraft power bus shall also be monitored for interference susceptibility levels.

TO:

8.4.10 RF Airlink Test
The spacecraft contractor shall establish a simulated on-orbit RF environment to determine subsystem electromagnetic compatibility with the spacecraft in an on-orbit configuration. The spacecraft antennas shall be connected for free space radiation and shall receive uplink signals. The communication subsystem transmission channels shall be accessed with mission signals described in section 10.2 and its subsections. The spacecraft subsystems shall be configured for on-orbit operation and undergo parametric monitoring for electromagnetic susceptibility. The communication subsystem channels shall be compliant with the spurious requirements in section 10.2.1.12 over all spacecraft subsystem on-orbit configurations. The spacecraft power bus shall also be monitored for interference susceptibility levels. **(Note: Refer to CCR 6389A, Mod126 Deviation and Waiver (RDW) Summary in Appendix A)**

Changes to Imager ICD (DS80667-H00-010).

2. Make The Following Changes To Attachment C – GOES N-P Imager ICD (DS80667-H00-010).

Reference CCR: 7119, 4411A , 7110, 7112, 7113, 7114 & 7115

Description of the Changes:

FROM:

2.2 Instrument Contractor Documents

Document	*Rev*	*Title*
8175731	E	Module, Imager Sensor Interface Control Drawing
8175732	D	Module, Imager Electronics Interface Control Drawing
8175733	C	Module, Imager Power Supply Interface Control Drawing
8152317		Electronic Module Drill Template, Assembly of
8152330		Drill Template – Power Supply, Assembly of
8179881		Baseplate Drill Template – Imager, Assembly of

TO:

2.2 Instrument Contractor Documents

Document	Rev	Title
8175731	F	Module, Imager Sensor Interface Control Drawing
8175732	E	Module, Imager Electronics Interface Control Drawing
8175733	C	Module, Imager Power Supply Interface Control Drawing
8152317		Electronic Module Drill Template, Assembly of
8152330		Drill Template – Power Supply, Assembly of
8179881		Baseplate Drill Template – Imager, Assembly of

Change 8175732, Imager Electronics Interface Control Drawing sheets 2, 4 and 6 as shown in ITT EC 6265293.

Update section 5.5 to reflect the above change

Change 8175731, Imager Sensor Interface Control Drawing sheets 1, 2, 4, 5, 7, 8, 10, 11, 12, 13, 14, 15, and 16 as shown in ITT EC 6266807.

Change PL8147200, Flight Model – Imager as shown in ITT EC 6266807.

Change Paragraph 3.4.3.9 as follows: (Incorporates typo from CCR 4270. Not previously entered)

FROM:
The maximum stray magnetic field generated by the sensor, electronics, or power supply modules as measured at a distance of one meter from any module face and within a single-pole lowpass bandwidth of one Hertz shall be less than 30 nanoTesla peak-to-peak. The stray magnetic field measurement shall be referenced to the instrument-off condition. This requirement shall apply to any instrument operating mode. The limit for transient field emissions increases due to infrequent power configuration changes, such as Scan Power On and Scan Reset shall 50 nanoTesla.

TO:
The maximum stray magnetic field generated by the sensor, electronics, or power supply modules as measured at a distance of one meter from any module face and within a single-pole lowpass bandwidth of one Hertz shall be less than 30 nanoTesla peak-to-peak. The stray magnetic field measurement shall be referenced to the instrument-off condition. This requirement shall apply to any instrument operating mode. The limit for transient field emissions increases due to infrequent power configuration changes, such as Scan Power On and Scan Reset shall be 50 nanoTesla.

Change Table 5.3.2-1 item 5

FROM:

5.	Shock	Table 5.3.2-5	(11)

TO:

5.	Shock	Tables 5.3.2-5A & B	

Change Section 5.5 as shown: Reason - Sections 2.2 and Section 5.5 should have the same documents listed (title and revision).

FROM:

8175731, Rev B, Module Imager Sensor
8175732, Rev C, Module, Imager Electronics
8175733, Rev C, Module, Imager Power Supply
8152317, Rev -, Electronic Module Drill Template, Assembly of
8152330, Rev -, Drill Template – Power Supply, Assembly of
8179881, Rev -, Baseplate Drill Template – Imager, Assembly of

TO:

8175731,	Rev F,	Module Imager Sensor Interface Control Drawing
8175732,	Rev E,	Module, Imager Electronics Interface Control Drawing
8175733,	Rev C,	Module, Imager Power Supply Interface Control Drawing
8152317,	Rev -,	Electronic Module Drill Template, Assembly of
8152330,	Rev -,	Drill Template – Power Supply, Assembly of
8179881,	Rev -,	Baseplate Drill Template – Imager, Assembly of

Changes to Sounder ICD (DS80667-H00-012)

3. Incorporate the following changes to Attachment D – GOES N-P Sounder ICD (DS80667-H00-012).

Reference CCR's: 7120A

Description of Changes:

a. From:

2.2 Instrument Contractor Documents

Document	*Rev*	*Title*
8175756	E	Module, Sounder Sensor Interface Control Drawing
8175757	D	Module, Sounder Electronics Interface Control Drawing
8175758	C	Module, Sounder Power Supply Interface Control Drawing
8152317		Electronic Module Drill Template, Assembly of
8152330		Drill Template – Power Supply, Assembly of
8179880		Baseplate Drill Template – Sounder, Assembly of

TO:

2.2 Instrument Contractor Documents

Document	Rev	Title
8175756	F	Module, Sounder Sensor Interface Control Drawing
8175757	E	Module, Sounder Electronics Interface Control Drawing
8175758	C	Module, Sounder Power Supply Interface Control Drawing
8152317		Electronic Module Drill Template, Assembly of
8152330		Drill Template – Power Supply, Assembly of
8179880		Baseplate Drill Template – Sounder, Assembly of

Update section 5.5 to reflect the above change

Change 8175756, Sounder Sensor Interface Control Drawing sheets 1, 2, 4, 5, 6, 8, 10, 11, and 12 as shown in ITT EC 6266856.

Change PL8148000, Flight Model – Sounder as shown in ITT EC 6266856.

b. Description of Changes: Incorporate changes as documented in CCR's 7110, 7112, 7113, 7114 & 7115.

Changes to SXI ICD (DS80667-H00-011)

4. Make the following changes to Attachment E – GOES N-P Solar X-Ray Imager (DS80667-H00-011).

Reference CCR 4409

Description of the Changes:

Change section 3.3.1.3.1-1 **(Inadvertently added via CCR 4291A and should not have been.)**

FROM:

SXI3.3.1.3.1-1
The SXI Telescope envelope shall be as shown in LMATC Dwg. No. 2A06301. This includes volume for MLI blankets, volume for SXI side of all telescope electrical connectors, volume for all SXI telescope cables (not BSS harness), harness supports, test points (if any), witness sample locations, purge attach points, alignment mirrors, and includes volume for covers that must be removed before flight. The CEB blankets providing a light shield (sec SXI3.4.3) are not included in the static envelope defined in LMATC Dwg. #2A06301. This drawing also shows the additional volume required for access to remove the removable covers.

TO:

SXI3.3.1.3.1-1
The SXI Telescope envelope shall be as shown in LMATC Dwg. No. 2A06301. This includes volume for MLI blankets, volume for SXI side of all telescope electrical connectors, volume for all SXI telescope cables (not BSS harness), harness supports, test points (if any), witness sample locations, purge attach points, alignment mirrors, and includes volume for covers that must be removed before flight. This drawing also shows the additional volume required for access to remove the removable covers.

Delete sections 3.4.3-4, 3.4.3-5, 3.4.3-6, 3.4.3-7, 3.4.3-8 **(Inadvertently added via CCR 4291A and should not have been.)**

FROM:

SXI3.4.3-4

The SXI contractor shall provide a CEB light shield blanket that extends 1.00 ±0.05 in. beyond the CEB side radiator in the –Z (SXI) direction on the both the +Y (SXI) and +X (SXI) CEB sides as shown in the LMATC installation drawing 2A08999.

SXI3.4.3-5

The CEB light shield blanket shall have a minimum of 11 layers consisting of a minimum of 8 Vapor Deposited Aluminum layers, one 0.005 Kapton stiffener layer, and two Ge/Black Kapton layers (facing outward on both sides) as detailed in the LMATC design drawing 2A09000.

SXI3.4.3-6

The CEB light shield blanket shall have a slit at the corner where the two overhang sections meet to ensure smooth deployment.

SXI3.4.3-7

The CEB light shield Kapton stiffener layer shall be attached to the Ge/Black Kapton outer layer CEB side (by stitching or other means).

SXI3.4.3-8

The CEB side of the light shield (Ge/Black Kapton outer layer) shall be attached directly to the CEB side walls using Pressure Sensitive Adhesive.

TO:
Delete sections: SXI3.4.3-4; SXI3.4.3-5; SXI3.4.3-6; SXI3.4.3-7; SXI3.4.3-8

Change section 2.2 Reference Documents

FROM:

GSFC X-900-004 *Charged Particle Radiation Exposure of Geostationary Orbits*

EIA-422	*Electrical Characteristics of Balanced Voltage Digital Interface Circuits*

TO:

GSFC X-900-97-004	*Charged Particle Radiation Exposure of Geostationary Orbits for the GOES N, O, P, Q Satellite Program*
TIA-EIA-422	*Electrical Characteristics of Balanced Voltage Digita l Interface Circuits*

Change section 2.2.2 SXI Contractor Documents

FROM:	LMATC 2A06603G	Harness SXI
TO:	LMATC 2A06603H	Harness SXI

Change section 3.4.5.1.1-1 **(wording from Rev F-2 version**, typo when incorporating CCR 6381A)

FROM:

SXI3.4.5.1.1-1
For transient conditions occurring between 3 and 180 msec after unit turn-on or turn-off msec after unit turn-on or turn-off, the instantaneous S/C bus voltage shall remain within the limits of 39.5 to 46.0 V. For transient conditions occurring within 3 msec of unit turn-on or turn-off, bus voltages shall be as specified in Table 3-20.

TO:

SXI3.4.5.1.1-1
For transient conditions occurring between 3 and 180 msec after unit turn-on or turn-off, the instantaneous S/C bus voltage shall remain within the limits of 39.5 to 46.0 V. For transient conditions occurring within 3 msec of unit turn-on or turn-off, bus voltages shall be as specified in Table 3-20.

Table 3-20: Change (relay closed) to (relay close)

Change 3.3.2.4-3

FROM:

The Spacecraft contractor provided SXI external cables and harnesses shall comply with LMATC 2A06603. External cables and harnesses will also comply with GSFC X-900-004.

TO:

The Spacecraft contractor provided SXI external cables and harnesses shall comply with LMATC 2A06603. External cables and harnesses will also comply with GSFC X-900-97-004.

Change section 3.4.5.4.2-1:

FROM:

Bilevel digital data outputs shall have the following characteristics in Table 3-22 as measured at the SXI interface connector. These characteristics were defined using document *Electrical Characteristics of Balanced Voltage Digital Interface Circuits (EIA-422).*

TO:

Bilevel digital data outputs shall have the following characteristics in Table 3-22 as measured at the SXI interface connector. These characteristics were defined using document *Electrical Characteristics of Balanced Voltage Digital Interface Circuits (TIA-EIA-422).*

Changes to Table 3-15h:

The Notes should be numbered 1, 2, 3, 4. There's a typo on Pg 57-f of the SXI ICD Rev F in that the Notes show 4, 5, 6, 4.

Changes to Sounder ICD (DS80667-H00-012)

5. Incorporate the following changes to Attachment D – GOES N-P Sounder ICD (DS80667-H00-012).

Reference CCR's: 4110A, 7111, 7112, 7113, 7114, 7115 & 7121A

Description of Changes:

Change section 3.4.3.9 as follows: (CCR 4270 previously incorporated incorrectly)

FROM:

The maximum stray magnetic field generated by the sensor, electronics, or power supply modules as measured at a distance of one meter from any module face and within a single-pole lowpass bandwidth of one Hertz shall be less than 30 nanoTesla peak-to-peak. The stray magnetic field measurement shall be referenced to the instrument-off condition. This requirement shall apply to any instrument operating mode. The limit for transient field emissions increases due to infrequent power configuration changes, such as Scan Power On and Scan Reset shall be less than 50 nanoTesla.

TO:

The maximum stray magnetic field generated by the sensor, electronics, or power supply modules as measured at a distance of one meter from any module face and within a single-

pole lowpass bandwidth of one Hertz shall be less than 30 nanoTesla peak-to-peak. The stray magnetic field measurement shall be referenced to the instrument-off condition. This requirement shall apply to any instrument operating mode. The limit for transient field emissions increases due to infrequent power configuration changes, such as Scan Power On and Scan Reset shall be 50 nanoTesla.

Change section 3.6.2.3 as follows:

FROM:

The spacecraft shall contribute no more than 1.0mg/ft^2 (100 Å) nonvolatile residue to virtual surface of the instrument radiant cooler, filter wheel cooler, and optical aperture, and no more than 2.5 mg/ft^2 (250 Å) of nonvolatile residue to the instrument filter wheel cooler bucket optical solar reflectors.

TO:

The spacecraft shall contribute no more than 1.0mg/ft^2 (100 Å) of nonvolatile residue to virtual surface of the instrument radiant cooler, filter wheel cooler, and optical aperture, and no more than 2.5 mg/ft^2 (250 Å) of nonvolatile residue to the instrument filter wheel cooler bucket optical solar reflectors.

Change Table 5.3.2-1 item 5

FROM:

5.	Shock	Table 5.3.2-5	(11)

TO:

5.	Shock	Tables 5.3.2-5A & B	(11)

Change Section 5.5 as shown: Reason - Sections 2.2 and Section 5.5 should have the same documents listed (title and revision).

FROM:

8175756 Rev B, Module Sounder Sensor
8175757 Rev C, Module, Sounder Electronics
8175758 Rev C, Module, Sounder Power Supply
8152317 Rev -, Electronic Module Drill Template, Assembly of
8152330 Rev -, Drill Template – Power Supply, Assembly of
8179880 Rev -, Baseplate Drill Template – Sounder, Assembly of

TO:

8175756	E	Module Sounder Sensor Interface Control Drawing
8175757	E	Module, Sounder Electronics Interface Control Drawing

8175758	C	Module, Sounder Power Supply Interface Control Drawing
8152317		Electronic Module Drill Template, Assembly of
8152330		Drill Template – Power Supply, Assembly of
8179880		Baseplate Drill Template – Sounder, Assembly of

Description of Changes: Incorporate changes as documented in CCR's **7111, 7112, 7113, 7114, 7115 & 7121A**

Changes to Imager/Sounder GSE ICD (DS80667-H00-014)

5. Incorporate the following changes to Attachment D – GOES N-P Imager/Sounder GSE ICD (DS80667-H00-014).

Reference CCR's: 6390A, 7109

Description of Changes:

a. FROM:

2.1.2 ITT Documents

8189422	Imager and Sounder Target ICD, Revision Draft, 17 September 1999
8190276	Thermal Target Control Rack Cable Diagram, Revision Draft, 17 September 1999
8190269	Thermal Target Control Rack Wire List, Revision Draft, 17 September 1999
WL8190269	Interconnect Document GOES GSE Boeing, Revision Draft
8190276	Thermal Target Control Rack Cable Diagram, Revision Draft
8192028	Thermal ICD Spacecraft T/V Testing, Revision Draft

2.2.2 ITT Documents

8175779	RTP System Interface Control Document, Revision E, 20 January 1999
8175794	Spacecraft-Level Verification Test Plan, GOES-NO/PQ Imager, Revision A
8175795	Spacecraft-Level Verification Test Plan, GOES-NO/PQ Sounder, Revision A
8190163	TES Operator Handbook, Revision -, 24 August 1999
8162459	Thermocouple and Accelerometer Installation - Imager

8162460	Thermocouple and Accelerometer Installation - Sounder
8175777	Archive Spec

2.2.3 BSS Documents

DS80667-H00-010 June 2000 (8175726)	GOES Imager Interface Control Document, Revision E,
DS80667-H00-012 (8175751)	GOES Sounder Interface Control Document, Revision E, June 2000

Paragraphs; 3.1.1, 3.1.3, 3.2.8, 3.2.9, Table 3.2-2, Paragraph 3.2.12.2, 3.2.12.4.1, 3.2.12.4.2, Table 3.2-4, Paragraph 3.2.13.4, 5.1.1.3b, Appendix 9.1.1, Paragraph 8.1, 8.2, 9.1.1.1, 9.1.2.1, 9.1.2.7, Figures 3.1-1, 3.1-2, 3.1-4, 3.1-5, 3.2-2, 3.2-4, 3.2-8, Table 3.2-5

7.1 Mechanical GSE

Refer to section for the list of mechanical GSE that is GFE.

7.3 Non-flight Covers

Refer to section for the list of non-flight protective covers furnished with each instrument by ITT.

TO:

2.1.2 ITT Documents

8189422	Imager and Sounder Target ICD, Revision Draft, 17 September 1999
8190276	Thermal Target Control Rack Cable Diagram, Revision Draft, 17 September 1999
8190269	Thermal Target Control Rack Wire List, Revision Draft, 17 September 1999
8190276	Thermal Target Control Rack Cable Diagram, Revision Draft

2.2.2 ITT Documents

8175779	RTP System Interface Control Document, Revision E, 20 January 1999
8175794	Spacecraft-Level Verification Test Plan, GOES-NO/PQ Imager, Revision A

8175795	Spacecraft-Level Verification Test Plan, GOES-NO/PQ Sounder, Revision A
8190163	TES Operator Handbook, Revision C, 28 January 2002
8162459	Thermocouple and Accelerometer Installation - Imager
8162460	Thermocouple and Accelerometer Installation – Sounder
8175775	RTP Interface Control Document
8175777	Archive Spec
8177050	I/S Transportation, Lifting and Handling Test Procedure

2.2.3 BSS Documents

8175726 (DS80667-H00-010)	ICD for the GOES N-Q Imager
8175751 (DS80667-H00-012)	ICD for the GOES N-Q Sounder

Paragraphs; 3.1.1, 3.1.3, 3.2.8, 3.2.9, Table 3.2-2, Paragraph 3.2.12.2, 3.2.12.4.1, 3.2.12.4.2, Table 3.2-4, Paragraph 3.2.13.4, 5.1.1.3b, Appendix 9.1.1, Paragraph 8.1, 8.2, 9.1.1.1, 9.1.2.1, 9.1.2.7, Figures 3.1-1, 3.1-2, 3.1-4, 3.1-5, 3.2-2, 3.2-4, 3.2-8, Table 3.2-5 New Figures 3.2.12.2-1, 3.2.12.2-2 and 3.2.12.2-3 as shown in Attachment 1 to this modification.

7.1 Mechanical GSE

Refer to section 9.1.1.7 for the list of mechanical GSE that is GFE.

7.3 Non-flight Covers

Refer to section 9.1.1.8 for the list of non-flight protective covers furnished with each instrument by ITT.

b. Description of Changes: Incorporate changes as documented in CCR 7109.

Changes to Imager/Sounder EGSE (DS80667-H00-014A)

6. Incorporate the following changes to Attachment D – GOES N-P Imager/Sounder EGSE (DS80667-H00-014A).

Reference CCR's: 7072B

Description of Changes: Incorporate changes to Figures 3.2.5 and 3.2.6 as shown in CCR 7072B

Waivers to Imager ICD (DS80667-H00-010)

7. Incorporate the following waivers to Attachment C of The Imager ICD

Description of Waivers:

a. Waiver W6943: As documented in CCR 6405; waiver for out of specification limits for the signal line noise measurement requirements as tested during the safe-to-mate test.

b. Waiver W6912: As documented in CCR 6378; waiver to the Imager and Sounder ICD for the predicted exceedance of Imager Electronics and the Sounder Electronics pyroshock requirements during pre-separation events on the Delta IV LV.

Waivers to Sounder ICD (DS80667-H00-012)

8. Incorporate the following waivers to Attachment D – GOES N-P Sounder ICD (DS80667-H00-012).

Reference CCR's: 6405

Description of Waivers:

a. Waiver W6943: As documented in CCR 6405; waiver for out of specification limits for the signal line noise measurement requirements as tested during the safe-to-mate test.

Waivers to Imager/Sounder GSE ICD (DS80667-H00-014)

9. Incorporate the following waivers to Attachment D – GOES N-P Imager/Sounder GSE ICD (DS80667-H00-014).

Reference CCR's: 7109

Description of Waivers:

a. Waiver W6943: As documented in CCR 6405; waiver for out of specification limits for the signal line noise measurement requirements as tested during the safe-to-mate test.

10. The following CCR's are added to this contract by reference: CCR's 4409, 4410A,

4411A, 6389A, 6390A, 6400, 6405, 7072B, 7109, 7110, 7111, 7112, 7113, 7114, 7115, 7119, 7120A and 7121A.

The fixed price of this contract and the funds allotted for the performance thereof, shall not be deemed to be increased by this modification. In consideration of the modifications, including, but not limited to, all waivers, deviations, and Government provided accommodations, agreed to herein as complete and equitable adjustments for all work required by this modification and Configuration Change Requests (CCR's) referenced herein, and as being technically equivalent under Clause H.15 of the contract. The contractor hereby releases the Government from any and all liability under this contract for further equitable adjustments attributed to such facts and circumstances giving rise to this modification and the CCR's referenced herein.

End of Modification 126

Attachment 1

NAS5-98069

Changes to ICD DS80667-H00-014 as detailed in CCR 7109

GOES-NOPQ Configuration Change Request (CCR)	CCR: 7109 Rev:	PAGE 1
	Date Issued: 10/25/2004	

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Originator: KOZA (WILLIAMS)
Organization: ITT (GSFC/415) (GSFC/415/QSS)
PH No: 260-451-6564 (260-451-6117)
E-mail: mike.koza@itt.com
(rwilliams@goesmail.gsfc.nasa.gov)

WAV/DEV/ECP/Other#: ITT ECP; NAS5-98069 Horse Trade Item

Contract No(s): NAS5- 98069, 96090

PRIORITY: U **CLASS:** 1
E=EMERGENCY, U=URGENT, R=ROUTINE

Change effectivity: Indicate spacecraft, instruments, subsystems, etc. impacted.

SPACECRAFT				INSTRUMENT								INSTRUMENT SERIAL #s.					
GOES-N:	X	GOES-O	X	Sounder:	X	SXI:		EPS:		HEPAD		01	02	03	04	05	06
GOES-P:	X	GOES-Q	X	Imager:	X	SEM:		EUV:		XRS:		07	08 X	09 X	10 X	11 X	12
Other:				Magnetometer:		Other: **ICD - Imager and Sounder EGSE RTP**						Other SN #					

1. Description of change:

See attached ITT CCR 7109.

2. Reason for change:

See attached ITT CCR 7109.

3. Document(s) Affected:	DS80667-H00-014 (GSE-ICD)
Paragraph, Table, Figure: (P), (T), (F)	(P) 2.2.2, 3.1.1, 3.1.3, 3.2.8, 3.2.9, 3.2.12.2, 3.2.12.4.1, 3.2.12.4.2, 3.2.13.4, 8.1, 8.2, 9.1.1.1, 9.1.2.1, 9.1.2.7; (T) 3.2-2, 3.2-4, 3.2-5; (F) 3.1-1, 3.1-2, 3.1-4, 3.1-5, 3.2-2, 3.2-4, 3.2-8; (F) new 3.2.12.2-1 thru 3.2.12.2-3; (Appx) 9.1.1

Indicate required start date for emergency or urgent changes: 12/1/04

Explain why this is urgent or of an emergency:	Need to have this capability in place to support parallel testing of the GOES-N and GOES-O Imager and Sounder instruments on the spacecraft by December 2004.

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

	Impacts:		Electrical	X	GSE and GSE S/W		I and T, Test Procs		Mechanical		Structures
	ACS		Emulators		Harness:		I V and V		Mechanisms		Sys Assurance
	Command		Engineering Hrs		INR		Launch Vehicle		Performance		Telemetry
	Communications		Flight Ops		Instruments		Manufacuring Cost		Power/SA		Thermal
	Contamination		Flight S/W		Instrument Interface		Material Cost		Propulsion		Weight
	Data Handling		Ground System	X	Instrument Test Eq.		Materials		Schedule		Other:

6. Impact Statement:

See attached ITT CCR 7109.

7. Cost Impact Statement * **Cost estimate:**	NAS5-96090 - NO; NAS5-98069 - to be handled as a horse trade item
8. Schedule Impact Statement **Hours estimate:**	NO

* If yes, Please provide In-house cost estimate.

9. CCB Direction: ☐ Approve ☐ Disapprove ☐ Withdraw ☐ Level I Approval Required

Project Manager Certification: **Date:** **NOAA Concurrence:** **Date:**

Systems Assurance Manager: (as required) **Date:**

Comments

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Para 3.1.1 Bold/Underline indicates inserts and strikeouts indicate deletions

From:

3.1.1 Spacecraft RTP

Figure 3.1-1 presents a block diagram of the S/C EGSE interfaces. During spacecraft level testing, the RTP is made up of an Imager/Sounder TES (console, external displays, and rack), S/C Archive, and Analysis Workstation. It is important to point out that only one Command and Control Processor (CCP) is used for spacecraft level testing (instrument testing at ITT involves using a CCP for the Imager TES and another for the Sounder TES). A single operator interface provides for script execution capable of simultaneous command and control of both Imager and Sounder Instruments.

Spacecraft level testing of the GOES NO/PQ Imager and Sounder requires optical inputs and commands to the instruments with data, telemetry, and test point response from the instruments. In addition, some tests require data that describes the test environment. A specific list of the equipment required to support the Imager and Sounder Instrument testing at BSS is supplied in the Appendices. The RTP equipment supplied for instrument testing at BSS is comprised of the following subsystems:

a) Test Execution System (TES)
b) Analysis Workstation (AWS)
c) RTP Archive System (RAS)

Once the instruments have been integrated on the spacecraft, RTP relies on command and data exchanges with the spacecraft ground support equipment (S/C EGSE) to interface with the Imager and Sounder Instruments. Details on interfaces with the GOES Imager and Sounder can be found in the respective Instrument Interface Control Documents identified in paragraph ~~2.1.3~~. 2.2.3

Each test configuration is described in terms of a context diagram. Paragraph numbers indicated in the context diagrams indicate the paragraph of this document which defines the associated interface requirements. Details on RTP operation may be found in the TES Operator Handbook identified in paragraph ~~2.1.2~~ 2.2.2 and EPOCH 2000 documents identified in paragraph ~~2.1.3~~ 2.1.4

These changes were made per CCR 6390A

The RTP Hardware is comprised of nine (9) main units. They are identified as follows:

a) Imager/Sounder Test Execution System Console consists of the following units:
   - Command and Control Processor (CCP)
   - Ethernet Switch
   - Imager Wideband Front End Processor (WBF)
   - Imager Bit Synchronization Box (BSB)
   - Imager Alarm Panel
   - Imager Internal Display
   - Sounder Wideband Front End Processor (WBF)
   - Sounder Bit Synchronization Box (BSB)
   - Sounder Alarm Panel
   - Sounder Internal Display
b) Imager External Display
c) Sounder External Display

Approved Redlines (All)
X 3-1-2006
C. MALONEY

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Para 3.2.12.4 Bold/Underline indicates inserts and strikeouts indicate deletions

Add:

3.2.12.4.1

a)

1. Floor space requirements vary for each of the three different types of RTP(s). RTP Full requires the most space as shown in Figure 3.2-1. RTP Lite requires space for one (1) S/C RAS server rack and a table for four (4) monitors. RTP Full II space requirements are similar to RTP Full, except ~~is~~ it has no IDBs.

From:

3.2.12.4.2 RTP Rack Area

a) BSS shall provide adequate floor space to accommodate the RTP components as dimensioned in Figure 3.2-2.

b) The exact location of these components in a the discretion of BSS as limited by cable length and interconnection requirements (Refer to Table 3.2-5)

To:

3.2.12.4.2 RTP Rack Area

a) BSS shall provide adequate floor space to accommodate the RTP components as dimensioned in Figure 3.2-2.

b) The exact location of these components in a the discretion of BSS as limited by cable length and interconnection requirements (Refer to Table 3.2-5)

c) **RTP Full II has same footprint and floor requirements as RTP Full I minus the IDBs. RTP Lite requires floor space for one RAS Rack and a table for four (4) monitors.**

Para 3.2.13.4 Bold/Underline indicates inserts and strikeouts indicate deletions

From:

3.2.13.4 Calibration

b) BSS shall perform the calibration of the following COTS items:

c) ITT shall perform the calibration of the Analog to Digital Converter cards in the ADI Real Time Systems chassis (quantity 2 ADI chassis)

To:

3.2.13.4 Calibration

b) BSS shall perform the calibration of the following COTS items **for RTP Full only**:

c) ITT shall perform the calibration of the Analog to Digital Converter cards in the ADI Real Time Systems chassis (quantity 2 ADI chassis **per RTP Full systems for a total of four**)

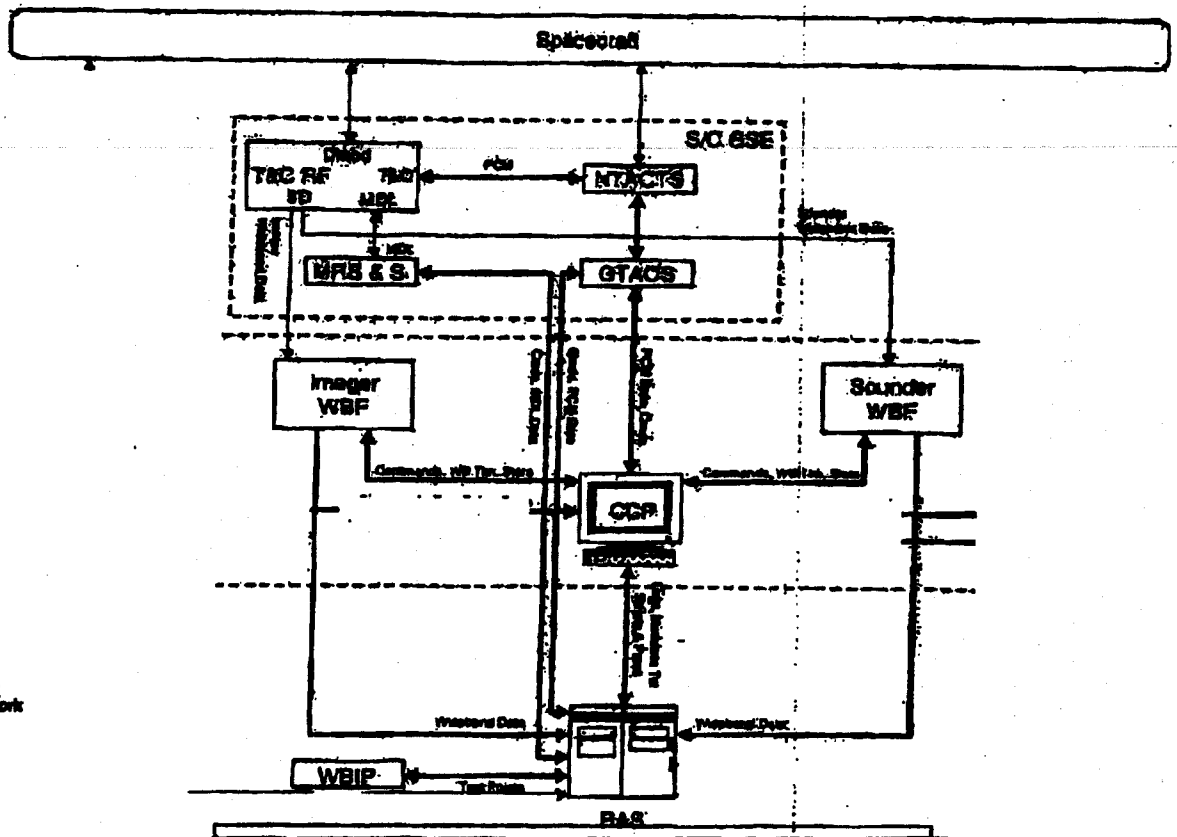
Approval, All Redlines C. Maloney

GOES N - Q CONFIGURATION CHANGE REQUEST (CCR) (continued) | CCR No: 7109 | Rev:- | Page 24 of 42
Date Issued: 10/25/2004

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Figure 3.1-1

To: (continued)



Heavier Lines Indicate Network Data

Figure 3.1-1a S/C Testing Interface Diagram for RTP Lite

b

R Wilbanis 2/23/06
P Bufo 2/24/06
Jenny Hayma 2/23/06
Joyce Rocco 2/24/06
Approved Redlines
(All) C. Maloney

CCR SIGNATURE APPROVAL PAGE

FOR

Documentation to Accommodate and Update additional RTP Test Systems

CCR: 7109 **Revision:** —
CCR DATE: 2/23/2006

C. Maloney 3-1-2006

GSFCProject Representative Date

Boeing Satellite System Date

ITT Imager/Sounder Representative Date

LMATC SXI Representative Date

CCR NO. 7109 Rev -

NO/PQ
CDRL 3-02
ECP
APPROVAL SHEET

		DATE
INSTRUMENT MANAGER		
IMAGER		10/25/04
SOUNDER		10/25/04
SYSTEM ENGINEERING	Steve P Buford	10/25/04
SYSTEM TEST		10-25-04
~~SYSTEMS INTEGRATION~~		
PRODUCT ASSURANCE		11/02/04
PROGRAM MANAGEMENT	Glenn Reis	11/3/04
CONFIGURATION		
NASA APPROVAL		11/9/04

Cover Approval Page
For
Imager and Sounder Documentation to Accommodate and Updated Additional RTP Test Systems

CCR: 7109 Rev -

CCR Date: 10/25/04

GSFC Project Representative Date	BSS Spacecraft Representative Date
Scott Davis 11/8/04	
ITT Imager/Sounder Representative Date	LMATC SXI Representative Date

GOES N - Q CONFIGURATION CHANGE REQUEST (CCR)	CCR No: 7109	Rev: -	Page 1
	Date Issued: 10/25/2004		of 42

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Originator: M. KOZA

Organization: ITT SSD LLC

Phone No: 250.451.6564

E-mail Address: mike.koza@itt.com

Dev / Wav / ECP / other #: CCR 4281 (ECP)

Contract Number(s): NAS5- 96090

Priority: U Class: 1 (1 or 2)

E = EMERGENCY, U = URGENT, R = ROUTINE

Insert X to indicate spacecraft, instruments, systems, subsystems, etc. impacted

Spacecraft				Instrument								Instrument Serial #s					
GOES-N	X	GOES-P	X	SOUNDER	X	SXI		EPS		HEPAD		01	02	03	04	05	06
GOES-O	X	GOES-Q	X	IMAGER	X	SEM		EUV		XRS		07	08 X	09 X	10 X	11 X	12
Other:				MAGNETOMETER		Other Sys/Subsys:						Other Serial #s:					

1. Description of change:

(USE ATTACHMENTS IF NECESSARY)

Detailed interface information is being provided to the GSE ICD in order to accommodate 2 additional RTP Test Systems.

2. Reason for change:

(USE ATTACHMENTS IF NECESSARY)

The current release of the GSE ICD does not include the necessary interface information for RTP Lite or the RTP Full II test systems

3. Documents Affected:	**DS80667-H00-014 (8175788)**
Paragraph, Table, Figure (P, T, F)	**Para. 2.2.2, Para 3.1.1, Para 3.1.3, Para 3.2.8, Para 3.2.9, Table 3.2-2, Para 3.2.12.2, Para. 3.2.12.4.1, Para 3.2.12.4.2, Table 3.2-4, Para. 3.2.13.4, Para 5.1.1.3b, Appendix 9.1.1, Para 8.1, Para 8.2, Para 9.1.1.1, Para 9.1.2.1, Para 9.1.2.7, Figures 3.1-1, 3.1-2, 3.1-4, 3.1-5, 3.2-2, 3.2-4, 3.2-8, Table 3.2-5 New Figures 3.2.12.2-1, 3.2.12.2-2, and 3.2.12.2-3**

4. Indicate required start date for emergency or urgent changes: 12/1//2004

Explain why this CCR is an emergency or urgent change: **Need to have this capability in place to support parallel testing of the GOES –N and GOES-O Imager and Sounder instruments on the spacecraft by December 2004**

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

5. Impacts		Electrical	X	GSE & GSE S/W		I&T & Test Procs		Mechanical		Structures
	ACS		Emulators		Harness		IV & V		Mechanisms		Systems Assurance
	Command		Engineering Hrs		INR		Launch Vehicle		Performance		Telemetry
	Comm		Flight Ops		Instruments		Manufacturing Cost		Power		Thermal
	Contamination		Flight S/W		Instrument I/F		Material		Propulsion		Weight
	Data Handling		Ground System	X	Inst Test Equip		Material Cost		Schedule		Other

6. Impact Statement:

This is a documentation configuration update for existing test equipment. The included information is required for successful integration into the GSE.

7. Cost Impact Statement * Cost Estimate:	No
8. Schedule Impact Statement Hours Estimate:	No

* If yes, please provide in-house cost estimate.

9. CCB Direction: ☐ Approve ☐ Disapprove ☐ Withdraw ☐ Level 1 Approval Required

PROJECT MANAGER APPROVAL: DATE: NOAA CONCURRENCE: DATE:

COMMENTS:

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Para 2.2.2 Bold/Underline indicates inserts and strikeouts indicate deletions

From:

8190163 TES Operator Handbook, Revision - , 24 August 1999

To:

8190163 TES Operator Handbook, Revision **C , 28 January 2002**

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Para 3.1.1 Bold/Underline Indicates inserts and strikeouts indicate deletions

From continued:

d) Imager Test Execution System Rack consists of the following units:
- Real Time Station (RTS-20)
- Waveform Generators (WG)
- Programmable Filters (PF)
- Test Point Panel (TPP)
- Instrument Power Supply
- Card Cage Assembly (CCA)

e) Sounder Test Execution System Rack consists of the following units:
- Real Time Station (RTS-20)
- Waveform Generators (WG)
- Programmable Filters (PF)
- Test Point Panel (TPP)
- Instrument Power Supply
- Card Cage Assembly (CCA)

f) Imager Instrument Distribution Box (IDB)

g) Sounder Instrument Distribution Box (IDB)

h) Analysis Workstation (AWS)

i) RTP Archive system (RAS) consists of the following units:
- Archive Server
- Archive RAID
- Terminal
- Digital Linear Tape Drive

The Test Execution System (TES), consisting of the console, external displays, and rack, generates instrument commands, controls test inputs, and collects science data, telemetry, and test points for the spacecraft level testing of the instruments. The AWS analyzes the test data to extract instrument performance. The RAS is a short-term version of the main ITT archive located at the ITT Technical and Administrative Center (TAC) facility in Fort Wayne, Indiana. The RAS will store the test data and analysis results and allows BSS read-only access to the collected data. Figure 3.1-1 is a block diagram showing the ITT test equipment at the spacecraft level. Note that the IDBs are functionally included in the Input/Output Front end Processors (IOFs) in this diagram

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Para 3.1.1 Bold/Underline indicates inserts and strikeouts indicate deletions

To:

3.1.1 Spacecraft RTP

During spacecraft level testing any one of three different RTP versions may be used: RTP Full, RTP Lite, and RTP Full II. RTP **Full versions** are made up of an Imager/Sounder TES (console, external displays, and rack), S/C Archive, and Analysis Workstation. **RTP Lite is made up of an Imager/Sounder TES rack containing Command & Control and Archiving functionalities, along with external displays.** It is important to point out that only one Command and Control Processor (CCP) is used for spacecraft level testing (instrument testing at ITT involves using a CCP for the Imager TES and another for the Sounder TES). A single operator interface provides for script execution capable of simultaneous command and control of both Imager and Sounder Instruments. **It is also important to note that in addition to command, control, and the ability to archive data, RTP Full versions can use the instruments test points to perform set-aside testing. However, RTP Lite does not, therefore it cannot be used for set-aside testing. Figures 3.1-1a and 3.1-1b present a block diagram of the S/C EGSE interfaces for the three RTP systems**

Spacecraft level testing of the GOES NO/PQ Imager and Sounder requires optical inputs and commands to the instruments with data, telemetry, and test point response from the instruments. In addition, some tests require data that describes the test environment. A specific list of the equipment required to support the Imager and Sounder Instrument testing at BSS is supplied in the Appendices. ~~**The RTP equipment supplied for instrument testing at BSS is comprised of the following subsystems:**~~

~~**a) Test Execution System (TES)**~~
~~**b) Analysis Workstation (AWS)**~~
~~**c) RTP Archive System (RAS)**~~

Once the instruments have been integrated on the spacecraft, RTP relies on command and data exchanges with the spacecraft ground support equipment (S/C EGSE) to interface with the Imager and Sounder Instruments. Details on interfaces with the GOES Imager and Sounder can be found in the respective instrument Interface Control Documents identified in paragraph **2.2.3**.

Each test configuration is described in terms of a context diagram. Paragraph numbers indicated in the context diagrams indicate the paragraph of this document which defines the associated interface requirements. Details on RTP operation may be found in the TES Operator Handbook identified in paragraph **2.2.2** and EPOCH 2000 documents identified in paragraph **2.1.4**.

Para 3.1.1 Bold/Underline indicates inserts and strikeouts indicate deletions

To continued:

3.1.1.1 RTP Full I Test System

The RTP Full Hardware is comprised of nine (9) main units. They are identified as follows:

a) Imager/Sounder Test Execution System Console consists of the following units:
   - Command and Control Processor (CCP)
   - Ethernet Switch
   - Imager Wideband Front End Processor (WBF)
   - Imager Bit Synchronization Box (BSB)
   - Imager Alarm Panel
   - Imager Internal Display
   - Sounder Wideband Front End Processor (WBF)
   - Sounder Bit Synchronization Box (BSB)
   - Sounder Alarm Panel
   - Sounder Internal Display
   - **HP-IB Extender**
   - **UPS – 3kVA, 120VAC**

b) Imager External Display

c) Sounder External Display

d) Imager Test Execution System Rack consists of the following units:
   - Real Time Station (RTS-20)
   - Waveform Generators (WG)
   - Programmable Filters (PF)
   - Test Point Panel (TPP)
   - Instrument Power Supply
   - Card Cage Assembly (CCA)
   - **HP-IB Extender**
   - **UPS – 2.2kVA, 120VAC**

e) Sounder Test Execution System Rack consists of the following units:
   - Real Time Station (RTS-20)
   - Waveform Generators (WG)
   - Programmable Filters (PF)
   - Test Point Panel (TPP)
   - Instrument Power Supply
   - Card Cage Assembly (CCA)
   - **HP-IB Extender**
   - **UPS – 2.2kVA, 120VAC**

e: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Para 3.1.1 Bold/Underline indicates inserts and strikeouts indicate deletions

To continued:

f) Imager Instrument Distribution Box (IDB)
g) Sounder Instrument Distribution Box (IDB)
h) Analysis Workstation (AWS)
i) RTP Archive system (RAS) consists of the following units:
   - Archive Server
   - Archive RAID
   - Terminal
   - Digital Linear Tape Drive
   - **UPS – 5kVA, 208VAC**

3.1.1.2 RTP Lite Test System

The RTP Lite Hardware is comprised of three (3) main units identified as follows:

a) Imager/Sounder Test Rack consists of the following units:
   - **Command and Control Processor (CCP)**
   - **RTP Archive system (RAS) consists of the following units:**
     - **Archive Server**
     - **Archive RAID**
     - **Terminal**
     - **Digital Linear Tape Drive**
   - **Ethernet Switch**
   - **Imager Wideband Front End Processor (WBF)**
   - **Imager Bit Synchronization Box (BSB)**
   - **Sounder Wideband Front End Processor (WBF)**
   - **Sounder Bit Synchronization Box (BSB)**
   - **UPS - 6KVA, 208VAC**

b) Imager External Displays
c) Sounder External Displays

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Para 3.1.1 Bold/Underline indicates inserts and strikeouts indicate deletions

To continued:

3.1.1.3 RTP Full II Test System

The RTP Full II Hardware is comprised of seven (7) main units. They are identified as follows:

a) **Imager/Sounder Test Execution System Console consists of the following units:**
   - **Command and Control Processor (CCP)**
   - **Ethernet Switch**
   - **Imager Wideband Front End Processor (WBF)**
   - **Imager Bit Synchronization Box (BSB)**
   - **Imager Internal Display**
   - **Sounder Wideband Front End Processor (WBF)**
   - **Sounder Bit Synchronization Box (BSB)**
   - **Sounder Internal Display**
   - **HP-IB Extender**
   - **UPS - 3KVA, 120VAC**

b) **Imager External Display**

c) **Sounder External Display**

d) **Imager Test Execution System Rack consists of the following units:**
   - **Real Time Station (RTS-20)**
   - **Test Point Panel (TPP)**
   - **Card Cage Assembly (CCA)**
   - **HP-IB Extender**
   - **UPS - 2.2KVA, 120VAC**

e) **Sounder Test Execution System Rack consists of the following units:**
   - **Real Time Station (RTS-20)**
   - **Test Point Panel (TPP)**
   - **Card Cage Assembly (CCA)**
   - **HP-IB Extender**
   - **UPS - 2.2KVA, 120VAC**

f) **Analysis Workstation (AWS)**

g) **RTP Archive system (RAS) consists of the following units:**
   - **Archive Server**
   - **Archive RAID**
   - **Terminal**
   - **Digital Linear Tape Drive**
   - **UPS - 5KVA, 208VAC**

The Test Execution System (TES), consisting of the console, external displays, and rack, generates instrument commands, controls test inputs, and collects science data, telemetry, and test points **(RTP Full I&II ONLY)** for the spacecraft level testing of the instruments. The AWS **(RTP Full I&II ONLY)** analyzes the test data to extract instrument performance. The RAS is a short-term version of the main ITT archive located at the ITT Technical and Administrative Center (TAC) facility in Fort Wayne, Indiana. The RAS will store the test data and analysis results and allows BSS read-only access to the collected data. **Figures 3.1-1a and 3.1-1b are block diagrams showing the ITT test equipment at the spacecraft level. Note that the IDBs, used with RTP Full I only, are functionally included in the Input/Output Front end Processors (IOFs) in this diagram. Since RTP Full II has no IDBs, the test point cables mate directly to the back of each TES rack. RTP Full II does not have test point capability.**

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Para 3.1.3 Bold/Underline indicates inserts and strikeouts indicate deletions

From:

The network interfacing between the S/C EGSE and RTP is shown in Figure 3.1-2. Once the instruments have been integrated onto the spacecraft, instrument commands generated by RTP are transferred to the S/C EGSE via the Ethernet connection of the CCP. The S/C EGSE translates the instruments commands into the appropriate S/C commands and issues them to the S/C. The S/C PCM telemetry is downlinked to the S/C EGSE and is then sent via Ethernet to the CCP and RAS. The Imager and Sounder wideband data streams are sent from the S/C EGSE to the corresponding WBFs in the same NRZ-S PN encoded streams output from the instruments, Imager and Sounder test points are sent directly from the instruments to the respective IOFs.

To:

The network interfacing between the S/C EGSE and RTP is shown in Figure 3.1-2. Once the instruments have been integrated onto the spacecraft, instrument commands generated by RTP are transferred to the S/C EGSE via the Ethernet connection of the CCP. The S/C EGSE translates the instruments commands into the appropriate S/C commands and issues them to the S/C. The S/C PCM telemetry is downlinked to the S/C EGSE and is then sent via Ethernet to the CCP and RAS. The Imager and Sounder wideband data streams are sent from the S/C EGSE to the corresponding WBFs in the same NRZ-S PN encoded streams output from the instruments. Imager and Sounder test points are sent directly from the instruments to the respective **RTP Full I or II IOFs, and are not connected when using RTP Lite.**

Para 3.2.8 Bold/Underline indicates inserts and strikeouts indicate deletions

From:

3.2.8 RTP to Instrument Test Point Interface

To:

3.2.8 RTP Full to Instrument Test Point Interface (NA for RTP Lite)

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Para 3.2.9 Bold/Underline indicates inserts and strikeouts indicate deletions

From:

3.2.9 General Test Equipment Interface

To:

3.2.9 **RTP Full (1&2)** General Test Equipment Interface

Table 3.2-2 Bold/Underline indicates inserts and strikeouts indicate deletions

From:

Table 3.2-2 Node Names and IP Addresses

Description	Node Name	IP Address	
		ICST	ISF
Spacecraft CCP	rtpscccp	147.20.195.241	TBD-BSS
Spacecraft Imager WBF	rtpsiwbf	147.20.195.243	TBD-BSS
Spacecraft Imager IOF	rtpsiiof	147.20.195.242	TBD-BSS
Spacecraft Sounder WBF	rtpsswbf	147.20.195.245	TBD-BSS
Spacecraft Sounder IOF	rtpssiof	147.20.195.244	TBD-BSS
Spacecraft TES Ethernet Switch	rtpsc2900	147.20.195.246	TBD-BSS
Spacecraft Imager Terminal Server	rtpscits	147.20.195.247	TBD-BSS
Spacecraft Sounder Terminal Server	rtpscsts	147.20.195.248	TBD-BSS
Spacecraft Archive Server	rtpscarc1	147.20.195.237	TBD-BSS
	rtpscarc2	147.20.195.238	TBD-BSS
Spacecraft Analysis Workstation	rtpscaws	147.20.195.240	TBD-BSS
Spacecraft T/V Target Controllers Terminal Server	TBD-ITT	NA	NA
Spacecraft T/V ECT Controller	TBD-ITT	NA	NA
Spacecraft Support PC	TBD-ITT	NA	TBD-BSS
Spacecraft EGSE MRS&S	hmrss01	NA	TBD-BSS
	hmrss02	147.20.195.175	NA
Spacecraft EGSE GTACS	sunfs1	147.20.166.40	TBD-BSS
HITL GTACS	goessun5	147.20.195.249	NA
HITL Real-Time System	rts	147.20.195.22	NA
NTACTS Cortex	crtx1	147.20.195.239	TBD-BSS
Spacecraft EGSE Time Server	hscntpsrvr	147.20.195.23	TBD-BSS
Spacecraft EGSE WBIP	whip	147.20.195.24	TBD-BSS
Gateway (for RTP)	NA	147.20.195.1	TBD-BSS
RTP Network Switch	cisco/csc-conn	147.20.195.25	TBD-BSS
Net Mask	NA	255.255.255.0	TBD-BSS

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Table 3.2-2 Bold indicates inserts and strikeouts indicate deletions

To:

Table 3.2-2 Node Names and IP Addresses

Description	Node Name	IP Address	
		ICST	ISF
RTP Full			
Spacecraft CCP	rtpscccp	147.20.195.241	**192.79.65.101**
Spacecraft Imager WBF	rtpsiwbf	147.20.195.243	**192.79.65.102**
Spacecraft Imager IOF	rtpsiiof	147.20.195.242	**192.79.65.103**
Spacecraft Sounder WBF	rtpsswbf	147.20.195.245	**192.79.65.104**
Spacecraft Sounder IOF	rtpssiof	147.20.195.244	**192.79.65.105**
Spacecraft TES Ethernet Switch	rtpsc2900	147.20.195.246	**192.79.65.106**
Spacecraft Imager Terminal Server	rtpscits	147.20.195.247	**192.79.65.107**
Spacecraft Sounder Terminal Server	rtpscsts	147.20.195.248	**192.79.65.108**
Spacecraft Archive Server	rtpscarc1	147.20.195.237	**192.79.65.109**
Spacecraft Analysis Server	**rtpscasrv**	**NA**	**192.79.65.113**
Spacecraft Analysis Workstation	**rtpsaws**	**NA**	**192.79.65.27**
Spacecraft Support PC	**rtpscroc**	**NA**	**192.79.65.116**
RTP Lite			
Spacecraft CCP	**rtpltccp**	**NA**	**192.79.65.30**
Spacecraft Archive Server	**rtplyarc**	**NA**	**192.79.65.31**
Spacecraft Imager WBF	**rtpltiwbf**	**NA**	**192.79.65.32**
Spacecraft Sounder WBF	**rtpltswbf**	**NA**	**192.79.65.33**
Spacecraft Terminal Server	**rtpsltts**	**NA**	**192.79.65.34**
Spacecraft TES Ethernet Switch	**rtpsc2950**	**NA**	**192.79.65.35**
RTP Full II			
Spacecraft CCP	**rtpscccp2**	**NA**	**192.79.65.23**
Spacecraft Imager WBF	**rtpsiwbf2**	**NA**	**192.79.65.11**
Spacecraft Imager IOF	**rtpsiiof2**	**NA**	**192.79.65.9**
Spacecraft Sounder WBF	**rtpsswbf2**	**NA**	**192.79.65.41**
Spacecraft Sounder IOF	**rtpssiof2**	**NA**	**192.79.65.42**
Spacecraft TES Ethernet Switch	**rtpsc2924**	**NA**	**192.79.65.97**
Spacecraft Imager Terminal Server	**rtpscits2**	**NA**	**192.79.65.58**
Spacecraft Sounder Terminal Server	**rtpscsts2**	**NA**	**192.79.65.93**
Spacecraft Archive Server	rtpscarc2	147.20.195.238	**192.79.65.80**
Spacecraft Analysis Workstation	rtpscaws	147.20.195.240	**192.79.65.111**
Environmental Control system (ECS)			
Spacecraft TTC Terminal Server	**rtpsctvits**	**NA**	**192.79.65.114**
Spacecraft TTC ECT Controller	**rtpscecs**	**NA**	**192.79.65.115**
Spacecraft TTC Control PCC	**rtpscirtcpc**	**NA**	**192.79.65.48**
Spacecraft EGSE MRS&S	hmrss01	NA	**192.79.65.73**
	hmrss02	147.20.195.175	**192.79.65.120**
Spacecraft EGSE GTACS 1	goesfs1	147.20.166.40	**192.79.65.70**
Spacecraft EGSE GTACS 2	**goesfs2**	**NA**	**192.79.65.14**
HITL GTACS	goessun5	147.20.195.249	NA
HITL Real-Time System	rts	147.20.195.22	NA
NTACTS Cortex 1	**goesntacts1**	147.20.195.239	**192.79.65.71**
NTACTS Cortex 2	**goesntacts2**	**NA**	**192.79.65.124**
Spacecraft EGSE Time Server 1	**goesntp1**	147.20.195.23	**192.79.65.72**
Spacecraft EGSE Time Server 2	**goesntp2**	**NA**	**192.79.65.123**
Spacecraft EGSE WBIP	whip	147.20.195.24	**192.79.65.117**
Gateway (for RTP)	NA	147.20.195.1	TBD-BSS
RTP Network Switch	cisco/csc-conn	147.20.195.25	**192.79.65.112**
Net Mask	NA	255.255.255.0	**255.255.255.0**

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Para 3.2.12.2 Bold/Underline indicates inserts and strikeouts indicate deletions

From:

3.2.12.2 Power Services

BSS shall provide the power services as defined in Table 3.2-4.

To:

3.2.12.2 Power Services

BSS shall provide the power services as defined in Table 3.2-4 **and Figures 3.2.12.2-1, 3.2.12.2-2, and 3.2.12.2-3**

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Table 3.2-4 Bold/Underline indicates inserts and strikeouts indicate deletions

From:

Table 3.2-4 Facility Power Services

GFE Equipment	Equipment Rating	BSS SCTV Facility	ITT Plug	BSS Receptacle	Quantity
UPS 1 Operators Console Analysis Workstation	120V, 30A	120V, 20A	L5-30P	L5-30R	1
UPS 2 Imager TES Rack	120V, 30A	120V, 20A	L5-30P	L5-30R	1
UPS 3 Sounder TES Rack	120V, 30A	120V, 20A	L5-30P	L5-30R	1
Archive	220V, 30A	208V, 30A	L6-30P	L6-30R	1
Narrowfield Collimator	120V, 15A	120V, 20A	5-15P	5-15R	1
Integrating Sphere	220V, 30A	208V, 30A	L6-30P	L6-30R	1
Thermal Target Control Rack	120V, 20A	120V, 20A	L5-20P	L5-30R	5
General Test Equipment	120V, 15A	120V, 20A	5-15P	5-15R	4

To:

Table 3.2-4 Facility Power Services

GFE Equipment	Equipment Rating	BSS SCTV Facility	ITT Plug	BSS Receptacle	Quantity
RTP Full UPS 1 Operators Console Analysis Workstation	120V, 30A	120V, 20A	L5-30P	L5-30R	1
RTP Full UPS 2 Imager TES Rack	120V, 30A	120V, 20A	L5-30P	L5-30R	1
RTP Full UPS 3 Sounder TES Rack	120V, 30A	120V, 20A	L5-30P	L5-30R	1
RTP Lite Rack	**220V, 30A**	**208V, 30A**	**L6-30P**	**L6-30R**	**1**
RTP Full II					
Imager TES Rack	**120V, 30A**	**120V, 20A**	**L5-30P**	**L5-30R**	**1**
Sounder TES Rack	**120V, 30A**	**120V, 20A**	**L5-30P**	**L5-30R**	**1**
Operators Console	**120V, 30A**	**120V, 20A**	**L5-30P**	**L5-30R**	**1**
Archive Rack	208V, 30A	208V, 30A	L6-30P	L6-30R	1
Narrowfield Collimator	120V, 15A	120V, 20A	5-15P	5-15R	1
Integrating Sphere	220V, 30A	208V, 30A	L6-30P	L6-30R	1
Thermal Target Control Rack	120V, 20A	120V, 20A	L5-20P	L5-30R	5
General Test Equipment	120V, 15A	120V, 20A	5-15P	5-15R	4

e: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Inserts:

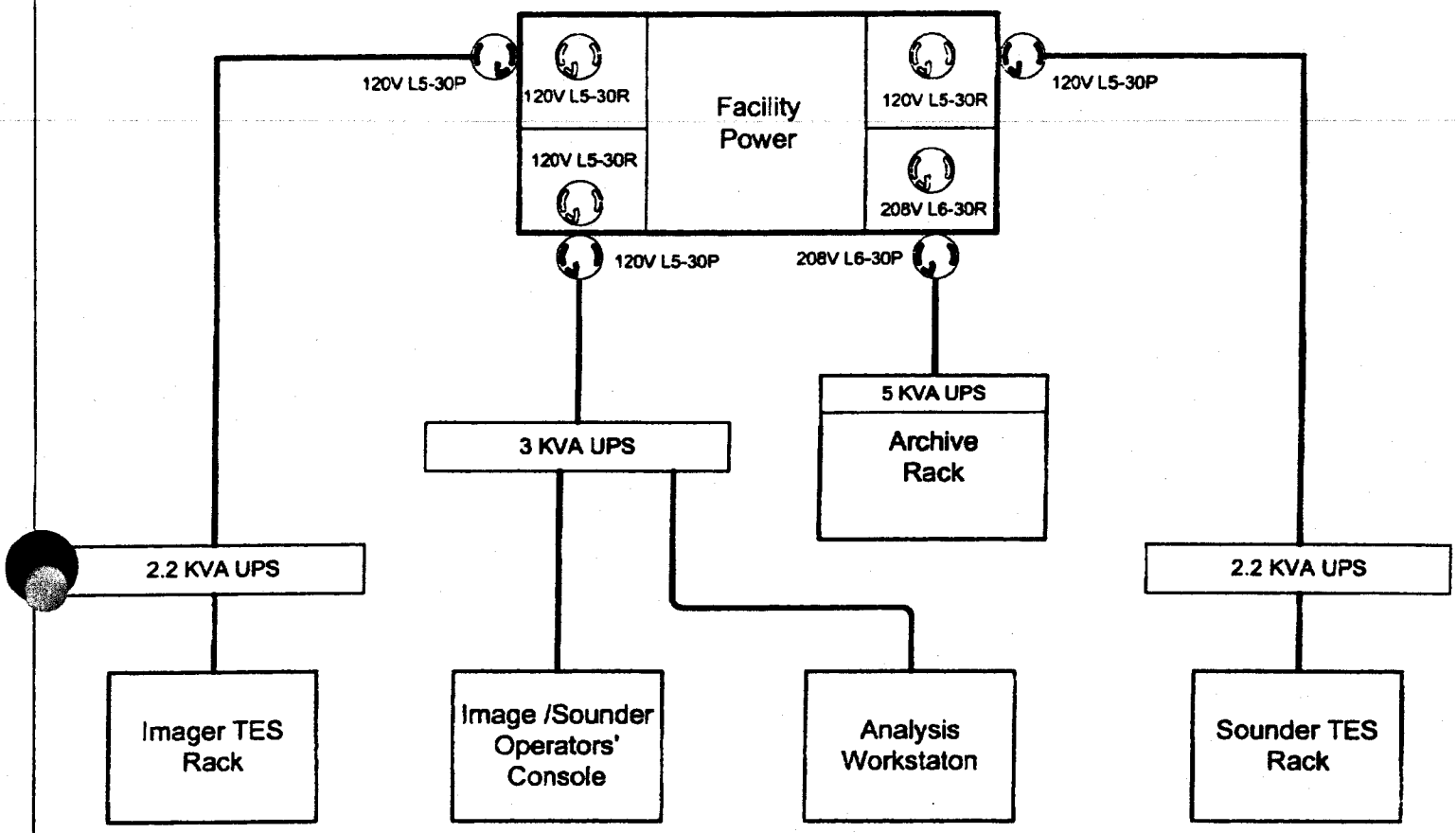


Figure 3.2.12.2-1 RTP Full I Power Configuration

Inserts:

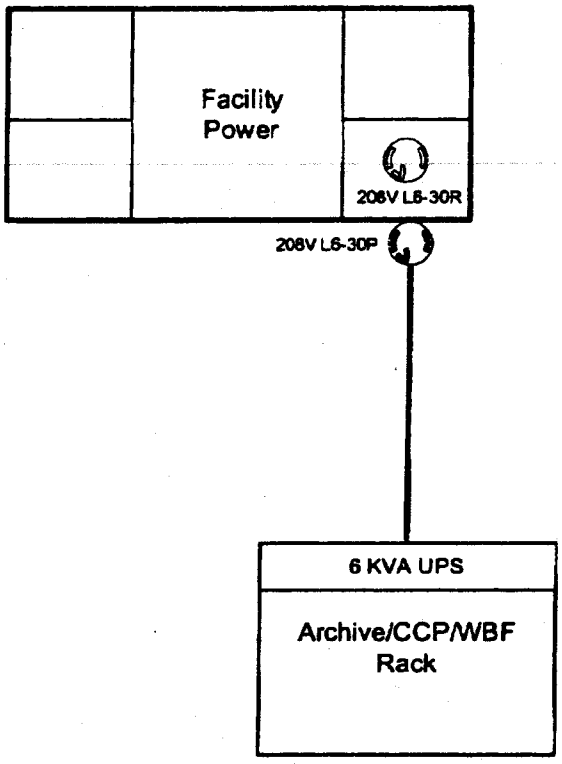


Figure 3.2.12.2-2 RTP Lite Power Configuration

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Inserts:

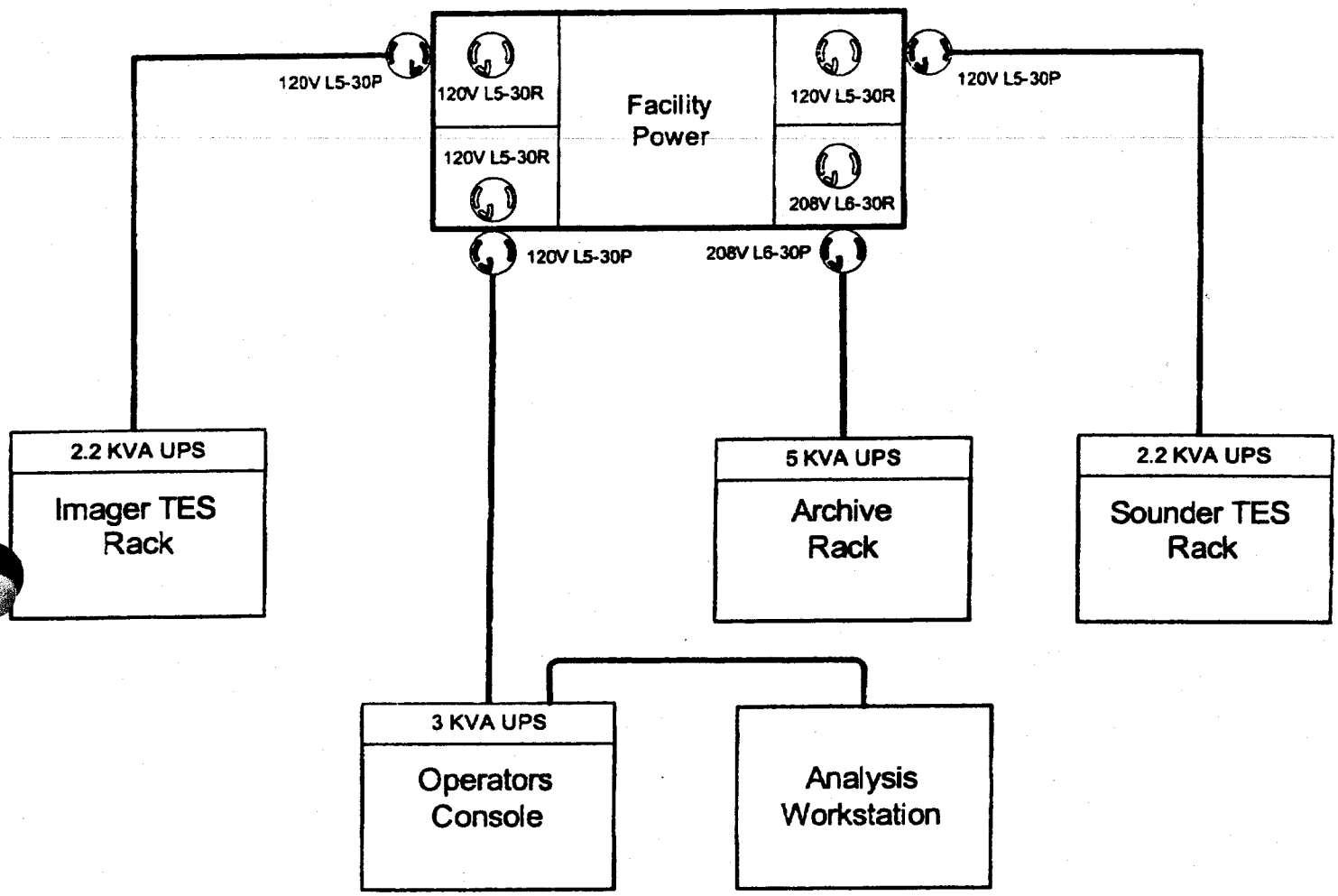


Figure 3.2.12.2-3 RTP Full II Power Configuration

le: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Para 5.1.1.3b Bold indicates inserts and strikeouts indicate deletions

From:

BSS shall supply all cables external to the vacuum chamber between the penetration plate and the Imager and Sounder IDB test point connectors as defined in paragraph 3.2.8.

To:

BSS shall supply all cables external to the vacuum chamber between the penetration plate and the Imager and Sounder IDB **(RTP Full I) or TES rack (RTP Full II)** test point connectors as defined in paragraph 3.2.8.

Para 8 Bold indicates inserts and strikeouts indicate deletions

From:

8 Handling

Refer to the I/S Transportation, Lifting, and Handling test procedure, ITT TP 8177050, for the procedures for safely transporting, handling, lifting, and purging a flight-quality GOES sensor module, electronics module, and power supply.

:

8 Handling

8.1 Imager and Sounder Instrument Shipping Requirements

Refer to the I/S Transportation, Lifting, and Handling test procedure, ITT TP 8177050, for the procedures for safely transporting, handling, lifting, and purging a flight-quality GOES sensor module, electronics module, and power supply

8.2 RTP Test System Shipping Requirements

- **An air ride truck is required for shipment of all RTP test systems**
- **There are no specific humidity requirements**
- **The temperature shall not exceed the range of -28 to 46 degrees C**

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Para 9.1.1.1 Bold/Underline indicates inserts and strikeouts indicate deletions

From:

9.1.1.1 RTP Test Systems

9.1.1.1.1 RTP Test System (ITT 8179177G2)

ITT 8179180G3 Imager/Sounder Test Execution System Console
ITT 8180401G2 Imager Test Execution System Rack
ITT 8180402G2 Sounder Test Execution System Rack
ITT 8180440G1 Imager Instrument Distribution Box (IDB)
ITT 8180440G2 Sounder Instrument Distribution Box (IDB)
ITT 8181812 Analysis Workstation (AWS)
ITT 8181814G2 RTP Archive System (RAS)
TBD Imager External Display
TBD Sounder External Display

9.1.1.1.2 Minimal RTP Test System

TBD UNIX workstation with a Wideband Front-end Processor and Archive

To:

9.1.1.1 RTP Test Systems

9.1.1.1.1 RTP **Full I** Test System (ITT 8179177G2)

ITT 8179180G3 Imager/Sounder Test Execution System Console
ITT 8180401G2 Imager Test Execution System Rack
ITT 8180402G2 Sounder Test Execution System Rack
ITT 8180440G1 Imager Instrument Distribution Box (IDB)
ITT 8180440G2 Sounder Instrument Distribution Box (IDB)
ITT 8181812 Analysis Workstation (AWS)
ITT 8181814G2 RTP Archive System (RAS)
NA Imager External Display
NA Sounder External Display

9.1.1.1.2 **RTP Lite Test System**

NA RTP Lite System Rack
NA **2 Imager and 2 Sounder External Displays**

9.1.1.1.3 **RTP Full II Test System**

ITT 8179180G4 Imager/Sounder Test Execution System Console
ITT 8180401G3 Imager Test Execution System Rack
ITT 8180402G3 Sounder Test Execution System Rack
ITT 8181812 Analysis Workstation (AWS)
ITT 8181814G3 RTP Archive System (RAS)
NA Imager External Display
NA Sounder External Display

le: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Para 9.1.2.1

From:

TBD Test Harness – TES to S/C GSE (Ethernet Cable; Wideband Cables, 1 for Imager and Sounder; and IRIG Cables, 1 each for Imager and Sounder)

To:

TBD Test Harness – TES to S/C GSE (Ethernet Cable; Wideband Cables, 1 for Imager and Sounder; and IRIG Cables, 1 each for Imager and Sounder, **RTP Full 1 or 2 only**)

9.1.2.7 IDB **(RTP Full I)/TES Rack (RTP Full II)** Test Harness Pin List

Para 9.1.2.7

From:

9.1.2.7 IDB Test Harness Pin List

To:

1.2.7 IDB **(RTP Full I)/TES Rack (RTP Full II)** Test Harness Pin List **(NA for RTP Lite)**

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Figure 3.1-1

From:

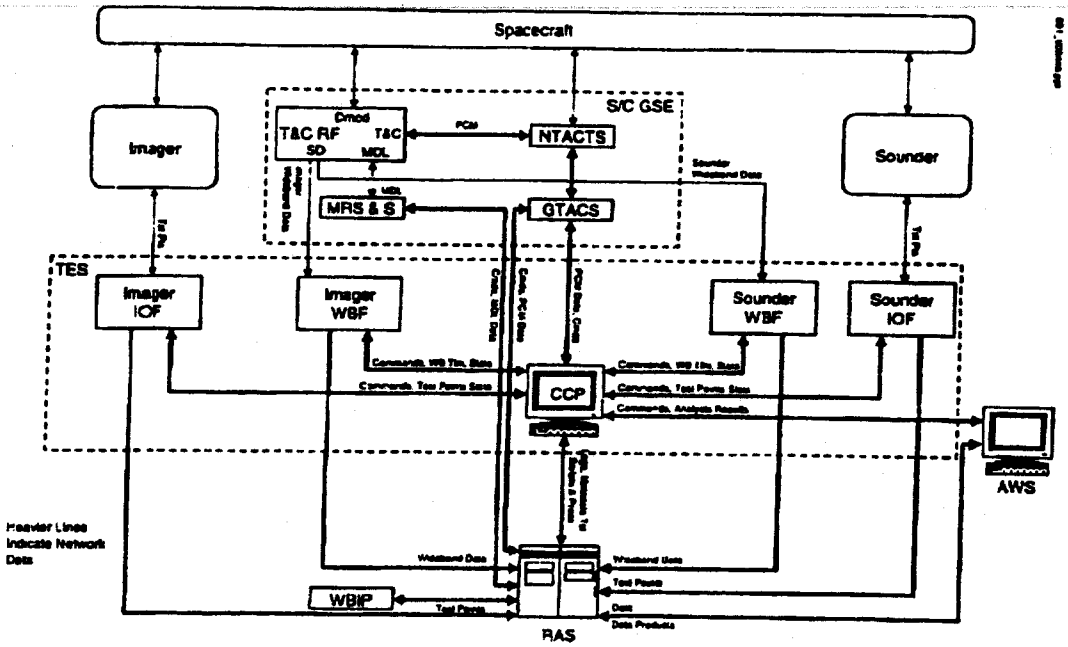


Figure 3.1-1 S/C Testing Interface Block Diagram

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Figure 3.1-1

To:

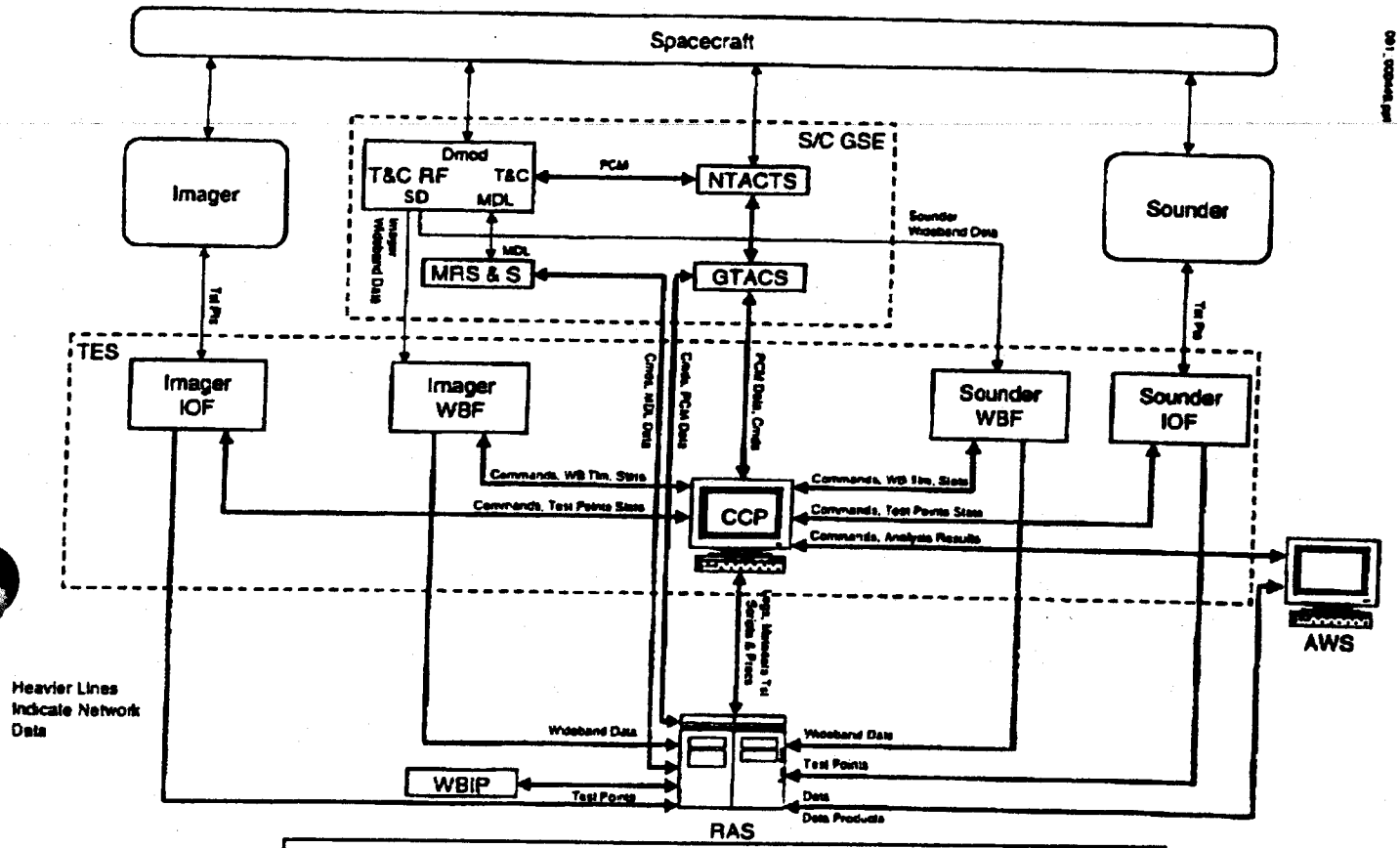


Figure 3.1-1a S/C Testing Interface Diagram for RTP Full I&II

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Figure 3.1-2

From:

RTP/EGSE SPACECRAFT-LEVEL NETWORK

All RTP network links are Full Duplex 100BaseT Ethernet, unless otherwise noted.

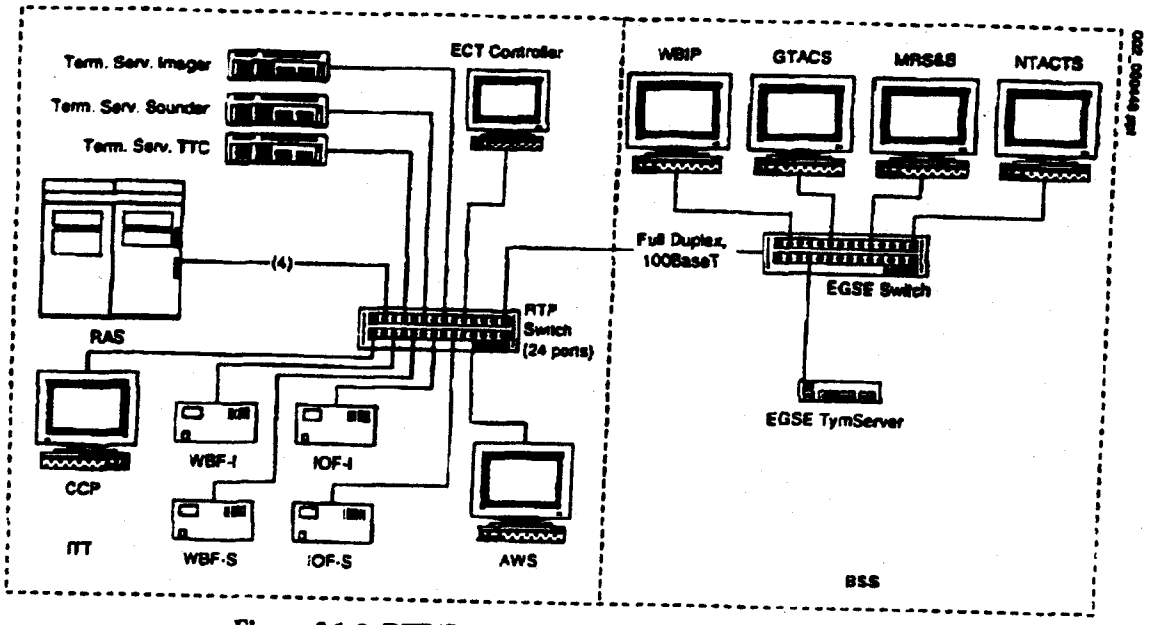


Figure 3.1-2 RTP/Spacecraft EGSE Network Architecture

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Figure 3.1-2

To:

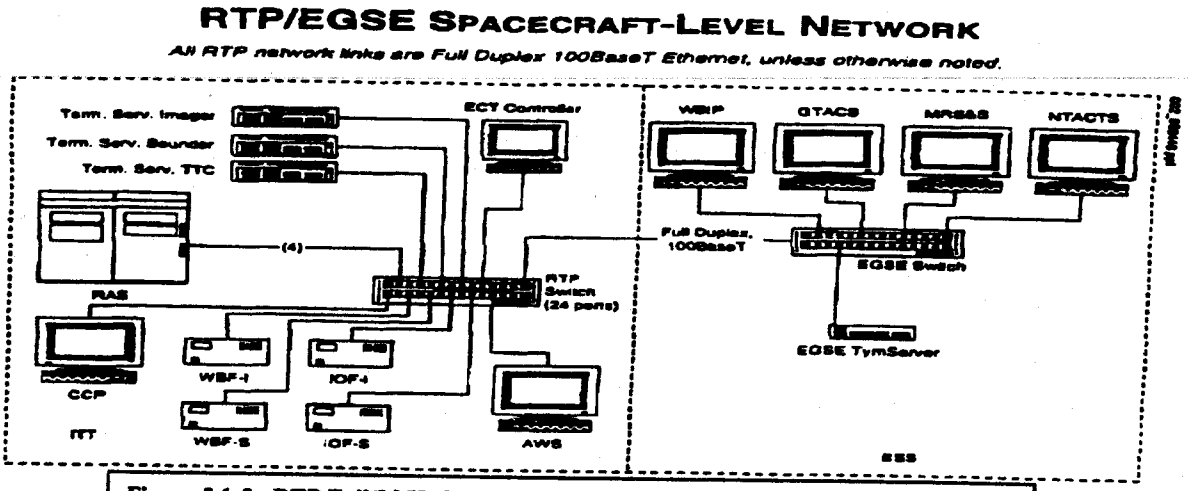


Figure 3.1-2a RTP Full(I&II)/Spacecraft EGSE Network Architecture

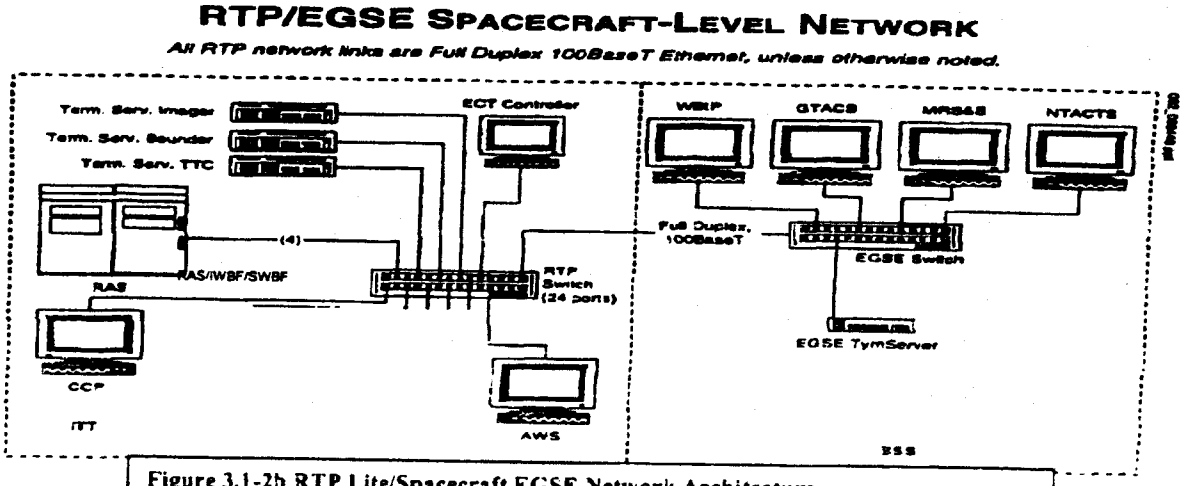


Figure 3.1-2b RTP Lite/Spacecraft EGSE Network Architecture

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Figure 3.1-4

From:

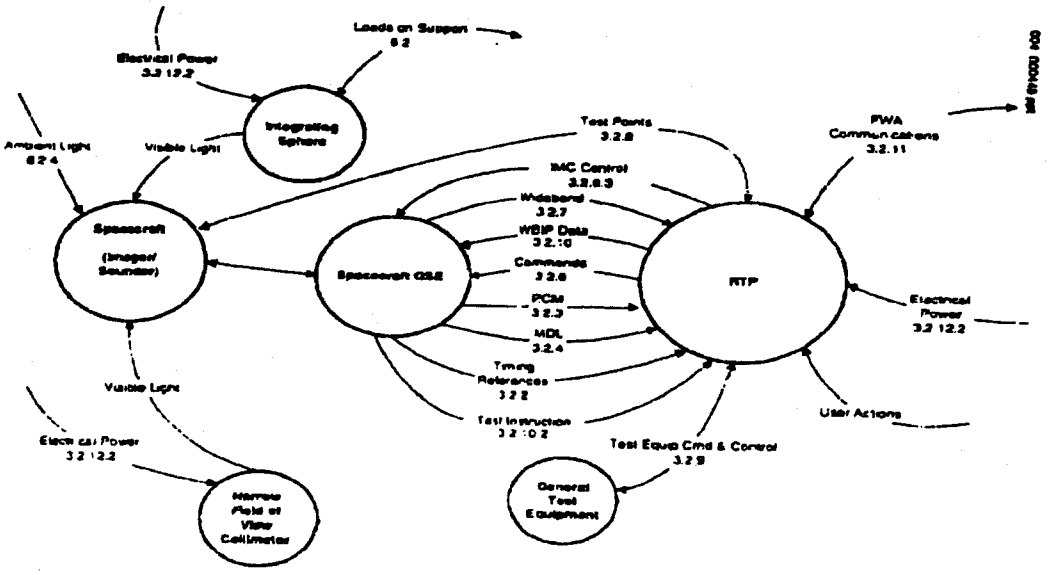


Figure 3.1-4 Spacecraft Ambient Test Configuration Context Diagram

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Figure 3.1-4

To:

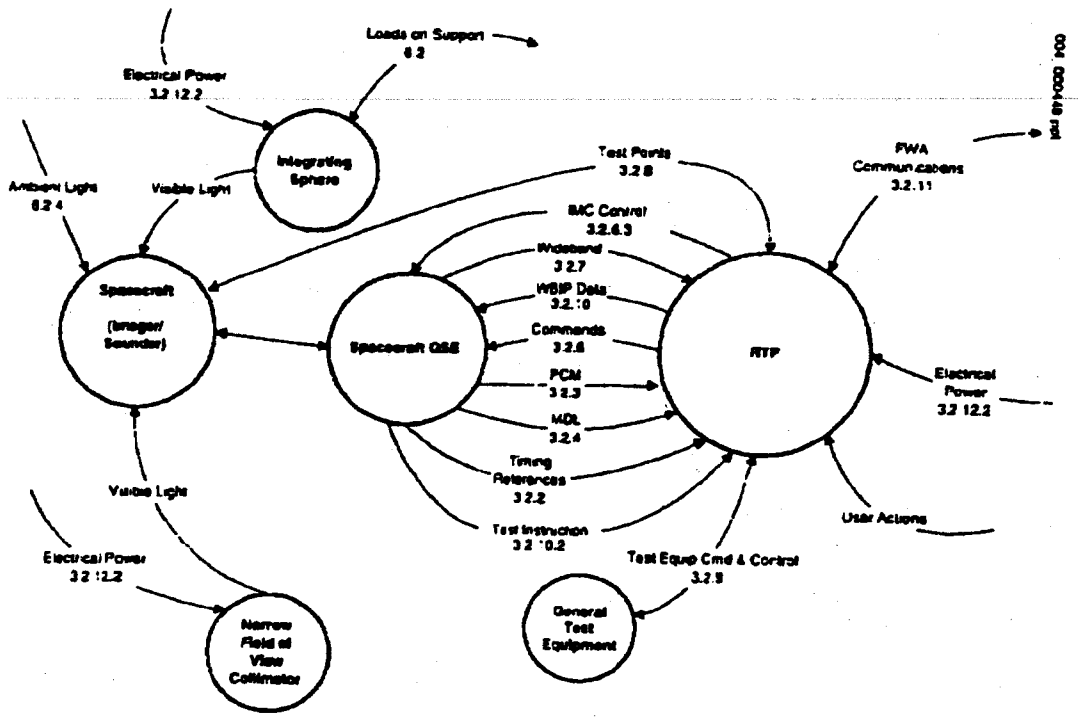


Figure 3.14a Spacrcraft Ambient Test Configuration Context Diagram (RTP Full I&II)

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Figure 3.1-4

To: (Continued)

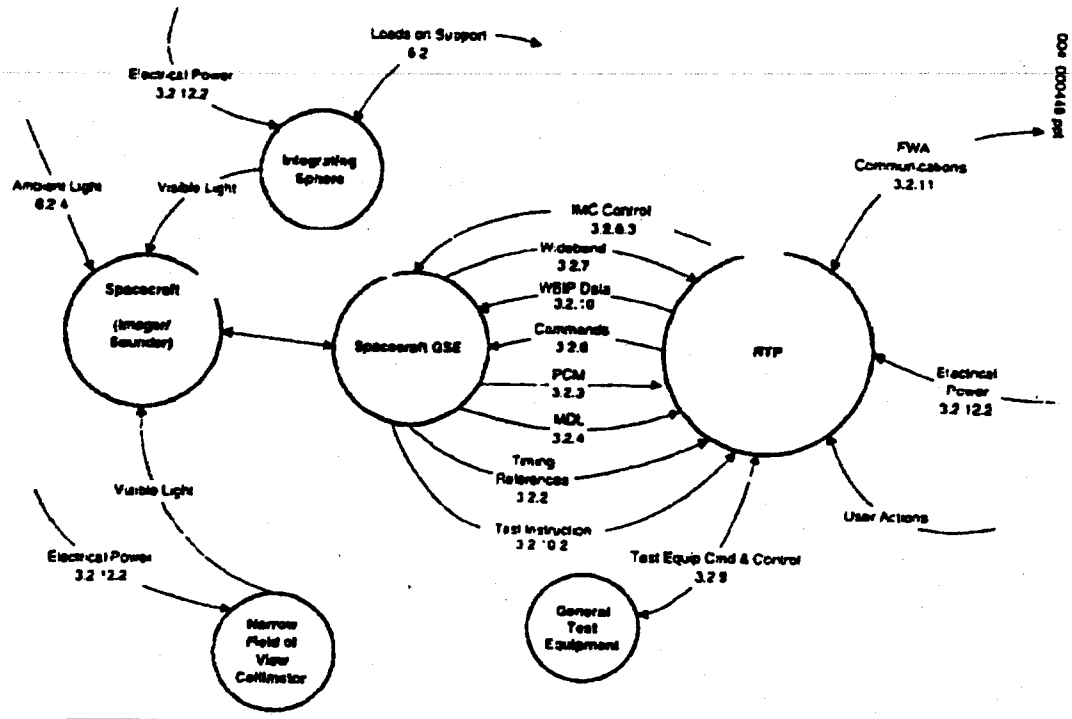


Figure 3.14b Spacrcraft Ambient Test Configuration Context Diagram (RTP Lite)

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Figure 3.1-5

From:

Figure 3.1-5 is the context diagram for the Spacecraft Thermal-Vacuum Test hardware configuration. See Figure 3.2-8 for a physical depiction of this configuration.

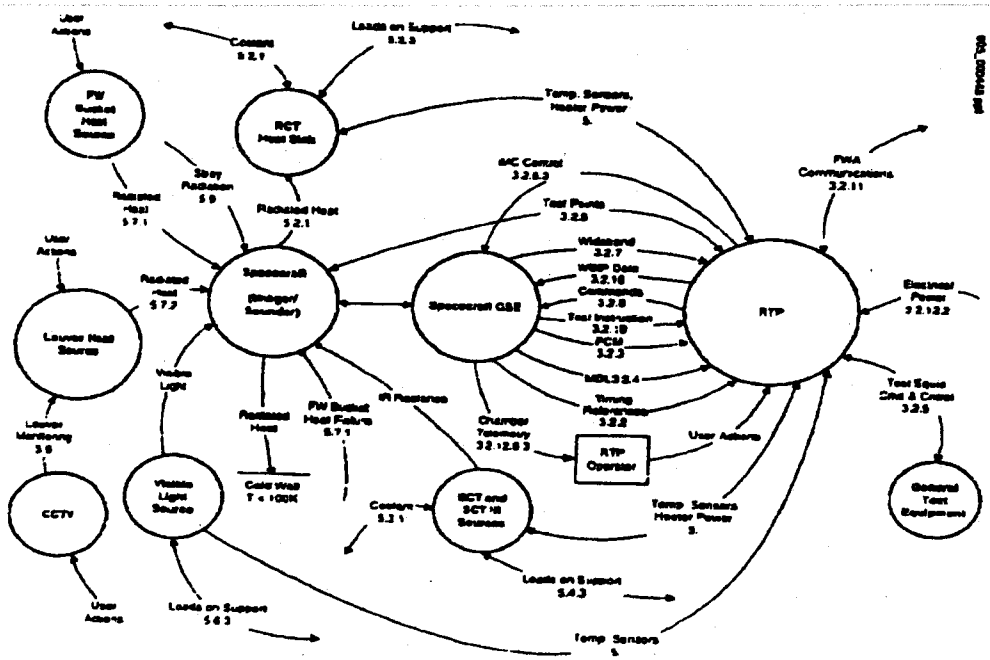


Figure 3.1-5 Spacecraft Thermal Vacuum Test Configuration Context Diagram

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Figure 3.1-5

To:

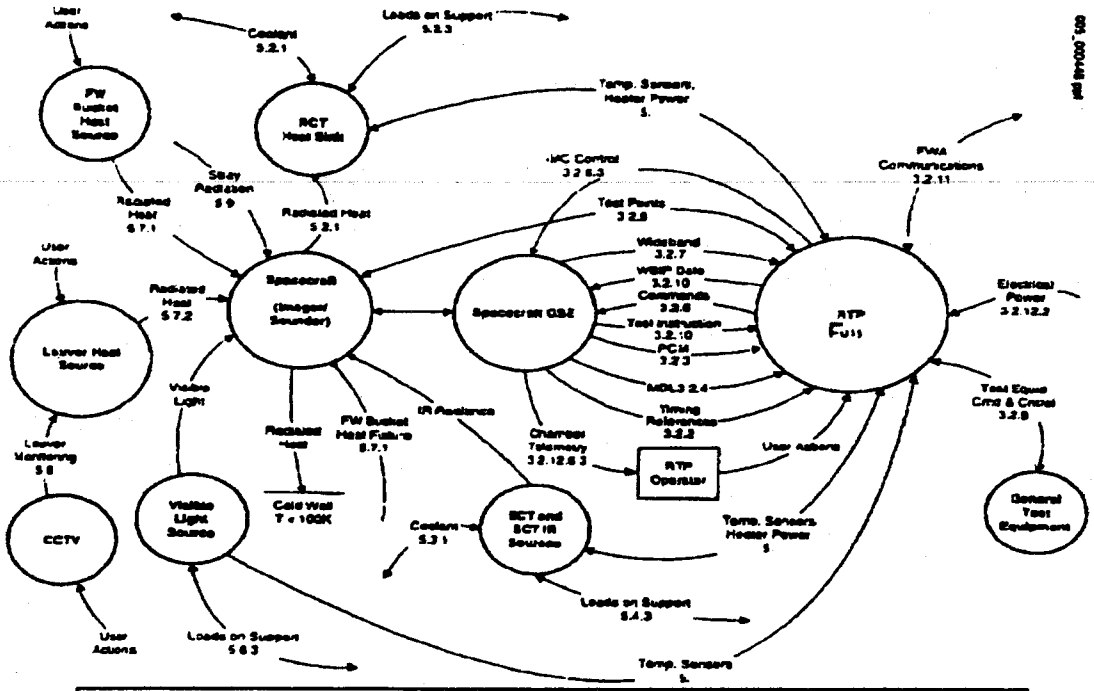


Figure 3.1-5a Spacecraft Thermal Vacuum Test Configuration Context Diagram (RTP Full I&II)

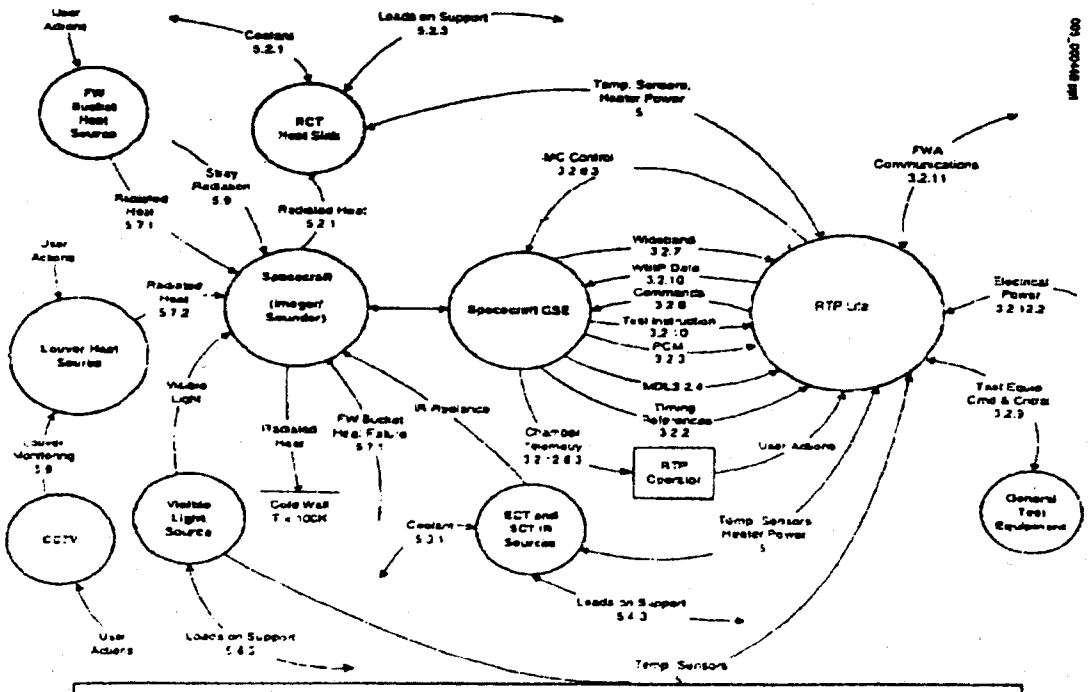


Figure 3.1-5b Spacecraft Thermal Vacuum Test Configuration Context Diagram (RTP Lite)

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Figure 3.2-2

From:

DS80667-H00-014 (8175788)
Rev A
5 October 2001

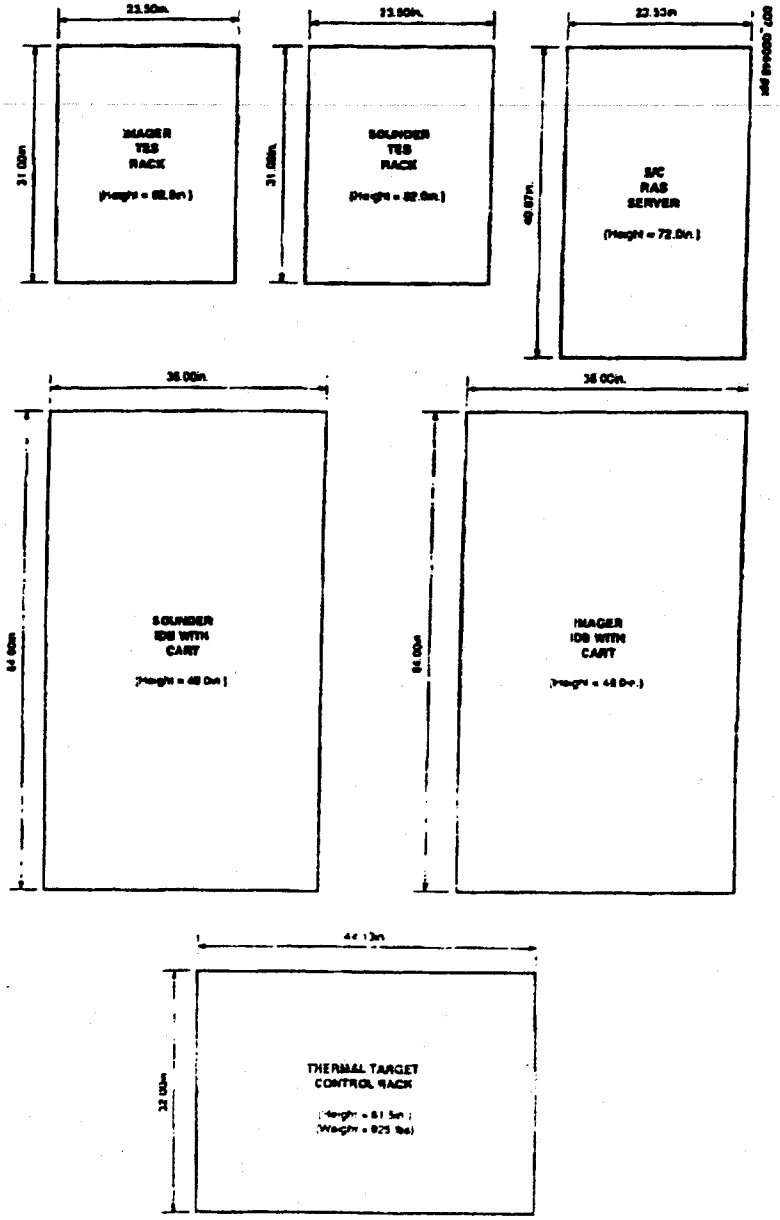


Figure 3.2-2 RTP Rack Footprints

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Figure 3.2-2

To:

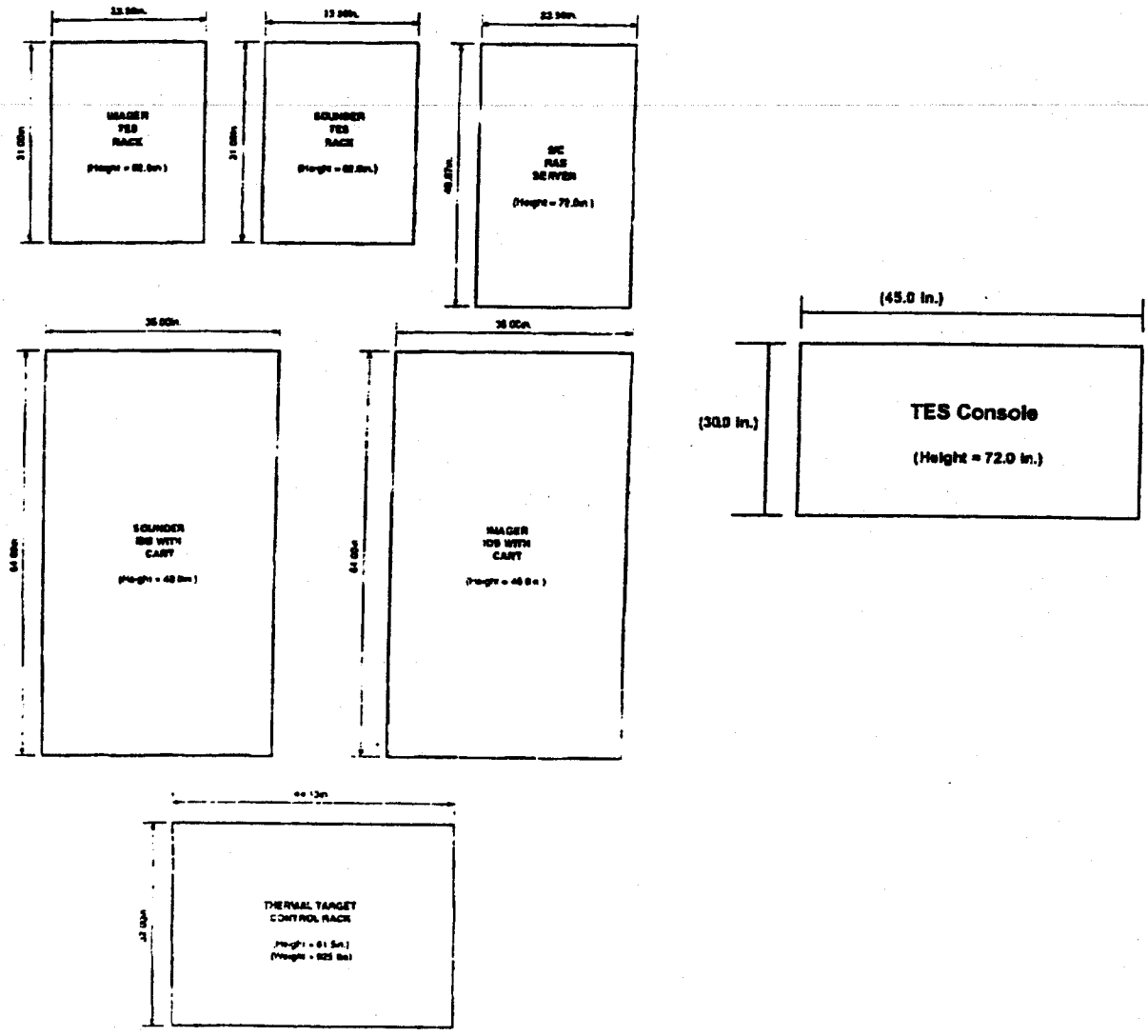
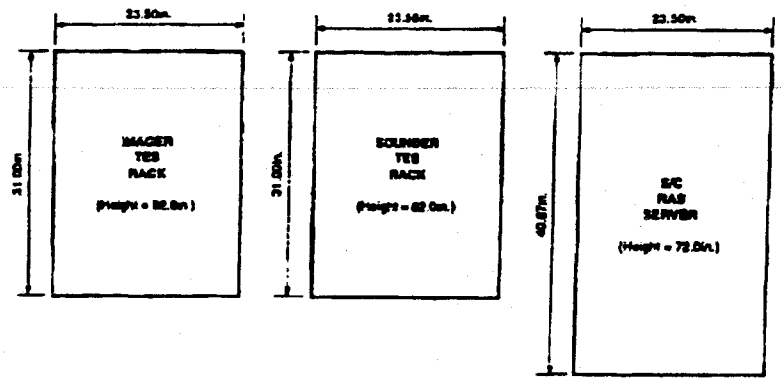


Figure 3.2-2a RTP Full I Rack Footprints

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Figure 3.2-2

To: (Continued)



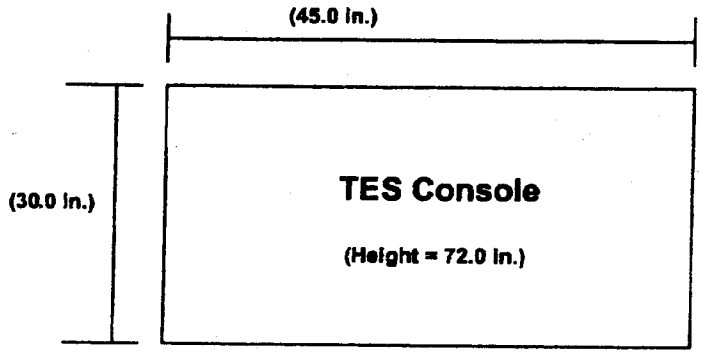


Figure 3.2-2b RTP Full II Rack Footprints

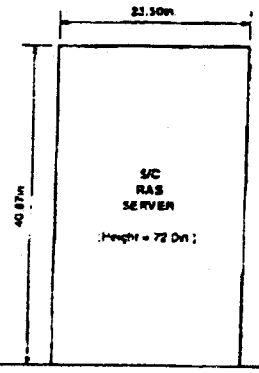


Figure 3.2-2c RTP Lite Rack Footprints

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Figure 3.2-4

From.

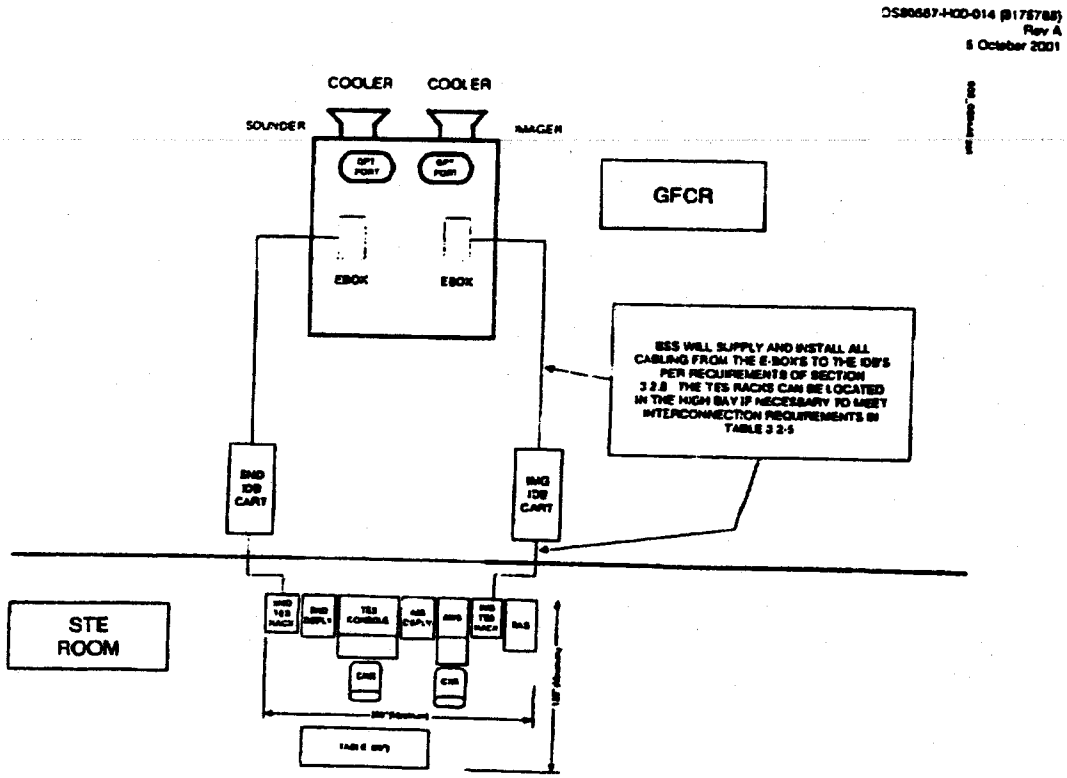


Figure 3.2-4 S/C Configuration for Electrical Tests (Top View)

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Figure 3.2-4

To:

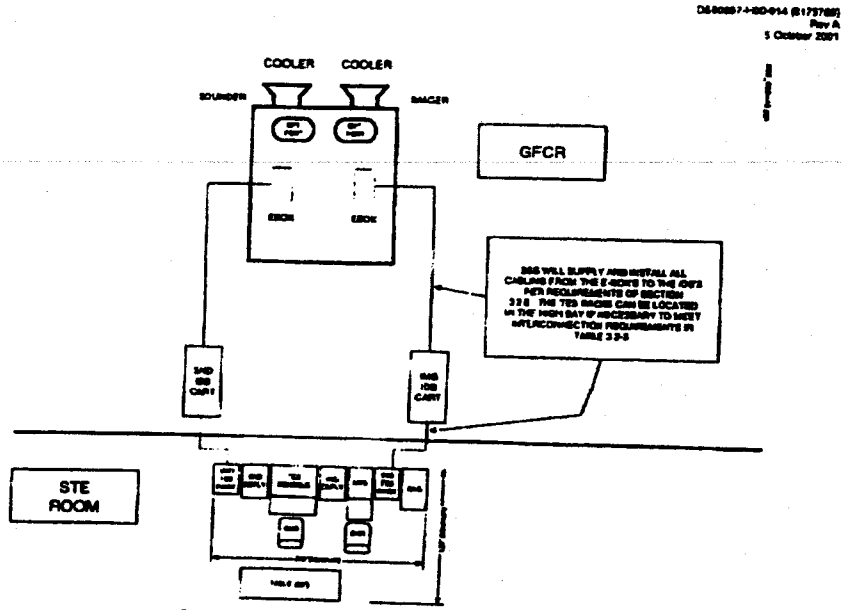


Figure 3.2-4 S/C Configuration for Electrical Tests (Top View)

Figure 3.2-4a S/C Configuration for Electrical Tests (Top View) for RTP Full I

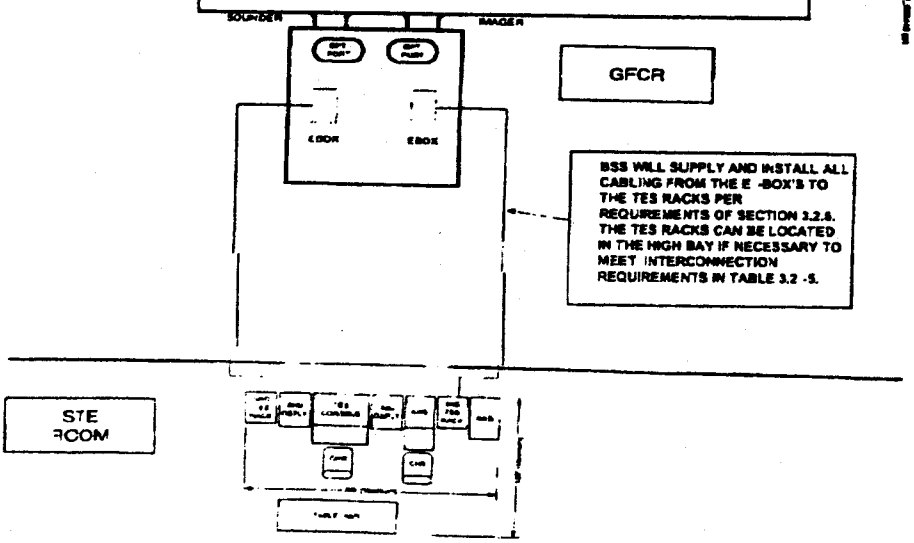


Figure 3.2-4b S/C Configuration for Electrical Tests (Top View) for RTP Full II

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Figure 3.2-8

From:

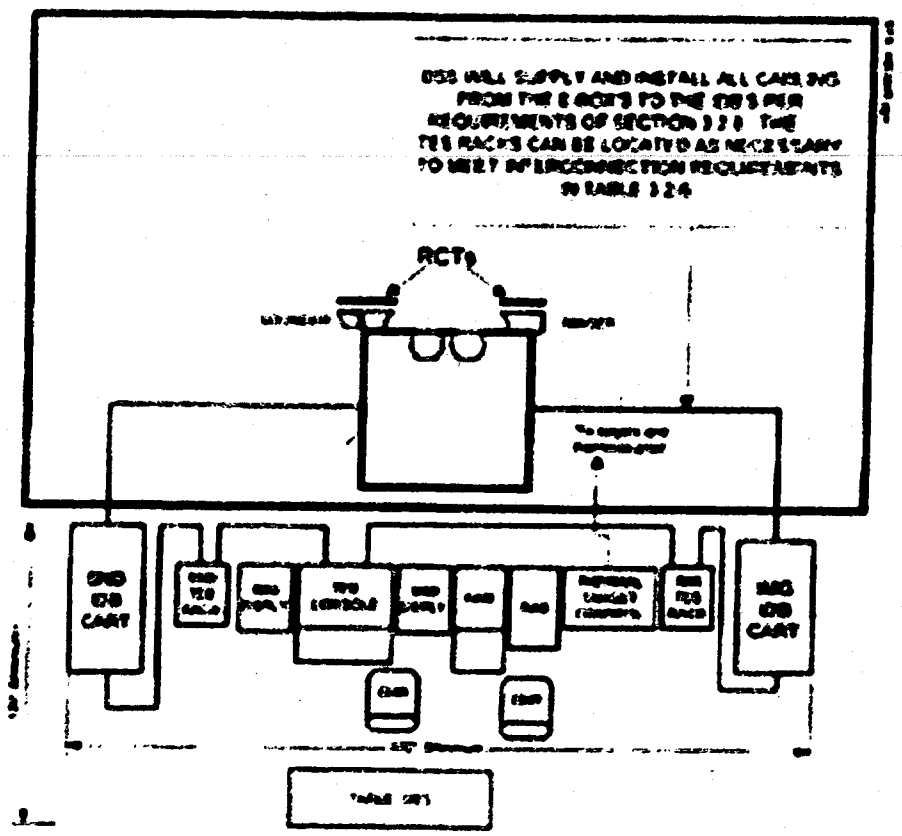


Figure 3.2-8 RTP Equipment Configuration During Thermal/Vacuum Testing (Example)

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Figure 3.2-8

To:

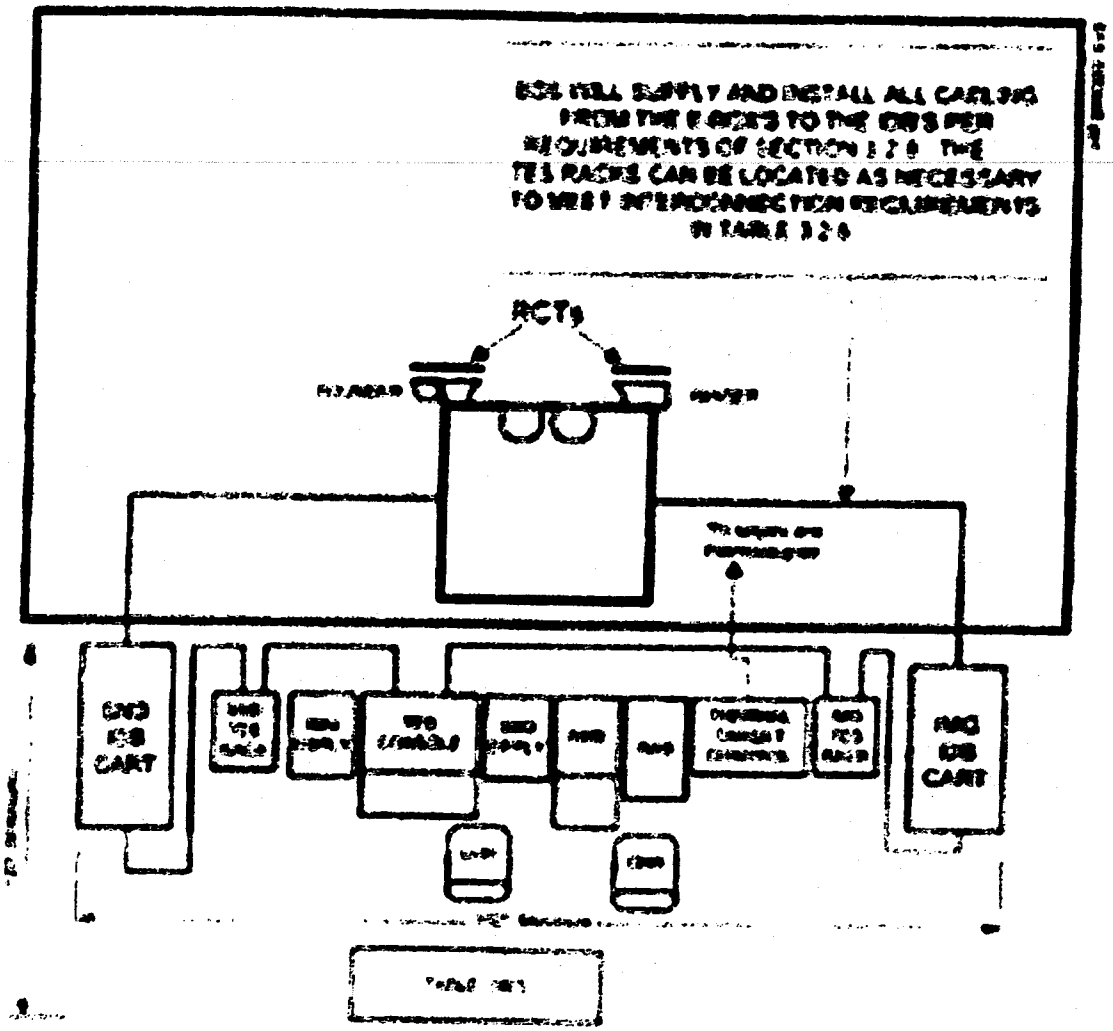


Figure 3.2-8a RTP Full I Equipment Configuration During Thermal/Vacuum Testing (Example)

Figure 3.2-8 Continued

To:

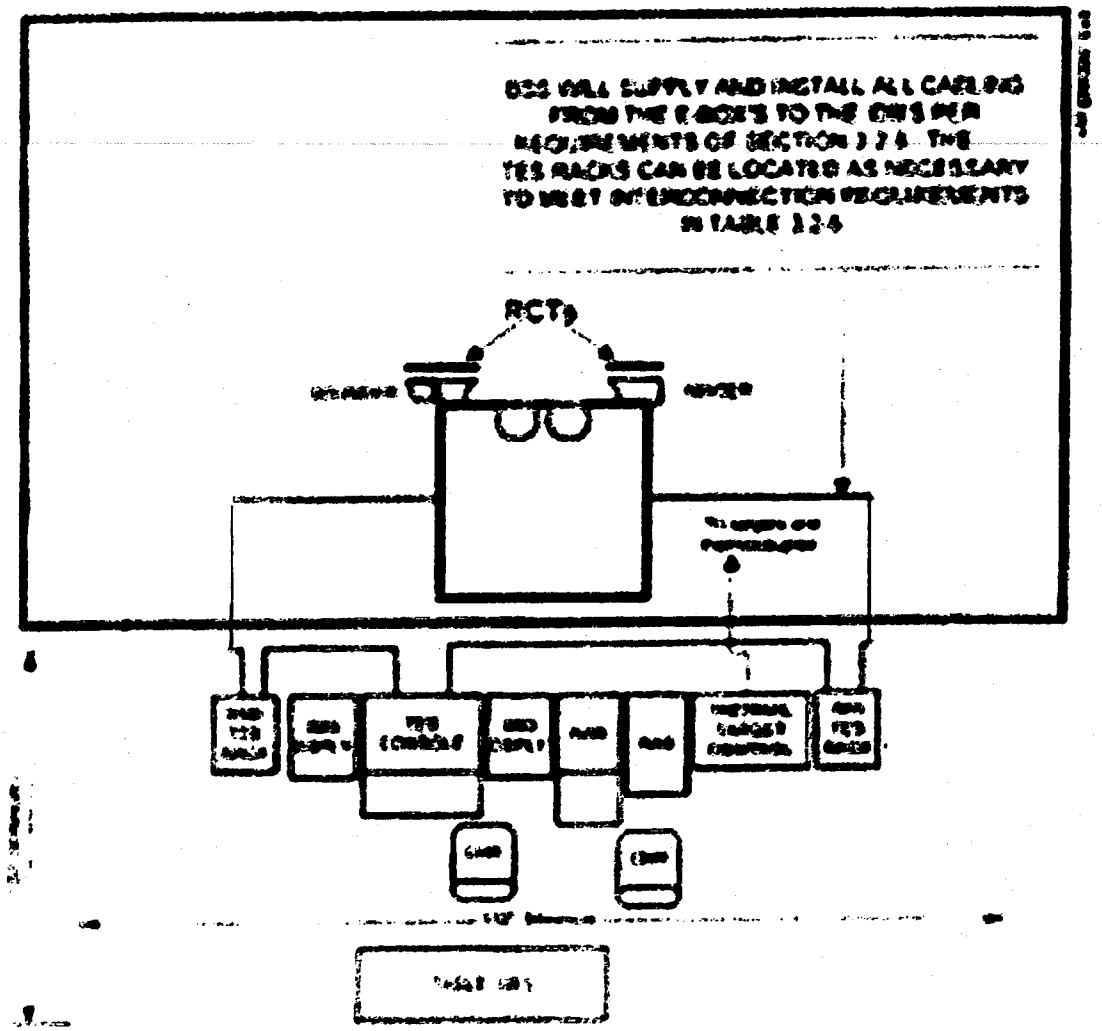


Figure 3.2-8b RTP Full II Equipment Configuration During Thermal/Vacuum Testing (Example)

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Table 3.2-5

From:

Table 3.2-5 RTP Equipment Interconnection Requirements (Maximum Cable Length)

	Imager/Sounder Test Execution System Console	Imager Test Execution System Rack	Sounder Test Execution System Rack	Imager Instrument Distribution Box (IDB)	Sounder Instrument Distribution Box (IDB)	Analysis Workstation (AWS)	RTP Archive System (RAS)	Thermal Target Control Rack	Chamber Penetration Plate	Narrowfield Collimator	Integrating Sphere	Spacecraft EGSE NTP Server	Imager E-Box Test Point Connectors	Sounder E-Box Test Point Connectors	Spacecraft EGSE Decom Rack
Imager/Sounder Test Execution System Console		<30'	<30'												TBD-BSS
Imager Test Execution System Rack				<12' TBR								<30'			
Sounder Test Execution System Rack					<12' TBR							<30'			
Imager Instrument Distribution Box (IDB)									TBD-BSS				TBD-BSS		
Sounder Instrument Distribution Box (IDB)									TBD-BSS					TBD-BSS	
Analysis Workstation (AWS)															
RTP Archive System (RAS)															
Thermal Target Control Rack									<30'						
Chamber Penetration Plate													TBD-BSS	TBD-BSS	
Narrowfield Collimator															
Integrating Sphere															
Spacecraft EGSE NTP Server															
Imager E-Box Test Point Connectors															
Sounder E-Box Test Point Connectors															
Spacecraft EGSE Decom Rack															

Note: If box is blank, there is no maximum cable length requirement.

b) The floor layout shall provide a minimum of 2 feet of space for access to and/or into the front and rear panel doors of the Operator's Console, the Analysis Workstation, the Imager TES Rack, the Sounder TES Rack, the Archive Server Rack, the Imager IDB, the Sounder IDB, and the Thermal Target Control Rack.

e: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Table 3.2-5

To:

Table 3.2-5a RTP Full I Equipment Interconnection Requirements (Maximum Cable Length)

	Imager/Sounder Test Execution System Console	Imager Test Execution System Rack	Sounder Test Execution System Rack	Imager Instrument Distribution Box (IDB)	Sounder Instrument Distribution Box (IDB)	Analysis Workstation (AWS)	RTP Archive System (RAS)	Thermal Target Control Rack	Chamber Penetration Plate	Narrowfield Collimator	Integrating Sphere	Spacecraft EGSE NTP Server	Imager E-Box Test Point Connectors	Sounder E-Box Test Point Connectors	Spacecraft EGSE Decom Rack
Imager/Sounder Test Execution System Console		<30'	<30'												TBD-BSS
Imager Test Execution System Rack				<12' TBR								<30'			
Sounder Test Execution System Rack					<12' TBR							<30'			
Imager Instrument Distribution Box (IDB)									TBD-BSS				TBD-BSS		
Sounder Instrument Distribution Box (IDB)									TBD-BSS					TBD-BSS	
Analysis Workstation (AWS)															
RTP Archive System (RAS)															
Thermal Target Control Rack									<30'						
Chamber Penetration Plate													TBD-BSS	TBD-BSS	
Narrowfield Collimator															
Integrating Sphere															
Spacecraft EGSE NTP Server															
Imager E-Box Test Point Connectors															
Sounder E-Box Test Point Connectors															
Spacecraft EGSE Decom Rack															

Note: If box is blank, there is no maximum cable length requirement.

Title: DOCUMENTATION TO ACCOMMODATE AND UPDATE ADDITIONAL RTP TEST SYSTEMS

Table 3.2-5

To: (Continued)

Table 3.2-5b RTP Full II Equipment Interconnection Requirements (Maximum Cable

	Imager/Sounder Test Execution System Console	Imager Test Execution System Rack	Sounder Test Execution System Rack	Analysis Workstation (AWS)	RTP Archive System (RAS)	Thermal Target Control Rack	Chamber Penetration Plate	Narrowfield Collimator	Integrating Sphere	Spacecraft EGSE NTP Server	Imager E-Box Test Point Connectors	Sounder E-Box Test Point Connectors	Spacecraft EGSE Decom Rack
Imager/Sounder Test Execution System Console		<30'	<30'										TBD-BSS
Imager Test Execution System Rack							TBD-BSS			<30'	TBD-BSS		
Sounder Test Execution System Rack							TBD-BSS			<30'		TBD-BSS	
Analysis Workstation (AWS)													
RTP Archive System (RAS)													
Thermal Target Control Rack							<30'						
Chamber Penetration Plate											TBD-BSS	TBD-BSS	
Narrowfield Collimator													
Integrating Sphere													
Spacecraft EGSE NTP Server													
Imager E-Box Test Point Connectors													
Sounder E-Box Test Point Connectors													
Spacecraft EGSE Decom Rack													

Note: If box is blank, there is no maximum cable length requirement.

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF 2 PAGES

2. AMENDMENT/MODIFICATION NO. 127

3. EFFECTIVE DATE See Blk 16

4. REQUISITION/PURCHASE REQ. NO. N/A

5. PROJECT NO. (If applicable) GOES N-P

6. ISSUED BY CODE 210.Y

NASA/Goddard Space Flight Center
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE

NASA Goddard Space Flight Center
Code 210.7
Greenbelt, MD 20771

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)

Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

See page 2 Amt:$0

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

X B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor X is not, is required to sign this document and return ____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

The purpose of the modification is to provide updated contract pages for changes made in Modification 118.

Accordingly,

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Glenn Stewart

15B. CONTRACTOR/OFFEROR

(Signature of person authorized to sign)

15C. DATE SIGNED

16B. UNITED STATES OF AMERICA

BY (Signature of Contracting Officer)

16C. DATE SIGNED 4/4/06

1. Replace pages B-1, B-2, B-16 and B-19 with the attached pages B-1, B-2, B-16 and B-19 (Attachment 1).

2. Replace pages H-2 and H-3 with the attached pages H-2 and H-3 (Attachment 2).

End of Modification

Attachment 1
Changes Pages for
NAS5-98069
Section B

B.1 DELIVERABLE REQUIREMENTS (GSFC 52.210-90) (OCT 1988)

The Contractor shall perform and/or deliver the following:

Contract Line Item Number (CLIN)	Description	Price
1.	On-Orbit Acceptance of GOES N Spacecraft	$364,654,971
2.	Propulsion Computer Model & Supporting Documentation	NSP
3.	a. Software Development & Validation Environment b. GTACS Workstation for SXI T&C, I&V and Software Development	NSP
4.	Source & Executable Flight Software Code	NSP
5.	Emulators w/Spare Parts S/C Emulator (3) S/C Emulator without upgraded MDL ASIC (1) 3 sets EACE components (1 set includes EACE board, EACE DPM daughter card, EACE PAM board; 3 sets ETC components (1 set includes ETC board and PAM board; 2 special order ovenized oscillators used by EACE	NSP
6.	INR Performance Evaluation System	NSP
7.	SXI to Spacecraft Harness	NSP
8.	Battery Test Cells (5 from each activation lot)	NSP
9.	Data for Communication Modeling Engineering Model Data Flight Model Data	NSP
10.	Acceptance of SSGS	NSP
11.	On-Orbit Acceptance of GOES O Spacecraft	$172,930,315

11a.	One set of GOES P Components as listed in Attachment M (formerly N/O Spares)	$49,500,000
11b	Additional Ground Support Special Test Equipment (Mod 73)	NSP
12.	Special Task Assignments with Reports	$ 7,125,350 See Clause B.9
13.	Additional Integration & Testing Support	$534,000 See Clause H.4
14.	Spacecraft Storage	$3,962,000 See Clause H.4
OPTION 1 15.	On-Orbit Acceptance of GOES P Spacecraft	$137,139,218
16	RESERVED	
17	Additional Integration & Testing Support	See Clause H.4
18	Spacecraft Storage	See Clause H.4

Total value of each CLIN, for purposes of final payment shall be reduced by Performance Based Payments made to the contractor for that CLIN.

(End of clause)

B.2 FIRM FIXED PRICE (18-52.216-78) (DEC 1988)

The total firm fixed price for this contract is $735,845,855.

(End of clause)

B.3 RESERVED

O44	STE Test Readiness Review	$4,562,500	Complete (Invoice 59)
O45	STE Site Acceptance Test	$4,562,500	Complete (Invoice 59)
O46	Launch Vehicle ICD	$5,000,000	Complete (Invoice 67)
O47	Preliminary Mission Analysis	$1,000,000	Launch – 12 mos
O48	Mission Unique Design Review #1	$1,000,000	Launch – 11 mos
O49	Final Mission Analysis	$1,000,000	Launch – 6.5 mos
O50	Mission Unique Design Review #2	$500,000	Launch – 3 mos
O51	Launch Vehicle Flight Program Verification	$500,000	Launch – 10 days
O52	Complete Fit Check (Launch Vehicle)/ Shock Test	$1,000,000	12/1/03
O53	EUV Re-Design PDR	$ 500,000	8/19/05
O54	EUV Re-Design CDR	$ 500,000	3/17/06
O55	EUV Re-Design Fabrication of 1st Article Telescope assembly	$ 650,000	11/30/06
O56	Delivery of Re-Designed GOES O EUV To Contractor	$ 250,000	5/1/07

GOES O Spares (GOES P Components)

OS1.	GOES O Spares Kick-Off Meeting	$13,000,000	11/05/01
OS2.	Place Order to Panametrics – SEM Instruments	$3,000,000	Complete (Invoice 46)
OS3.	Place Order for COMDEV Microwave Units	$3,100,000	Complete (Invoice 44)
OS4.	Place Order for SAAB Deployable Omni Antenna	$3,400,000	Complete (Invoice 45)
OS5.	Place Order for Ball Star Trackers	$3,500,000	Complete (Invoice 48)
OS6.	Order Solar Cells & Yoke	$3,300,000	Complete (Invoice 46)
OS7.	Order Structure Long Lead Parts	$2,500,000	Complete (Invoice 47)
OS8.	Order LHPs	$2,400,000	Complete (Invoice 48)
OS9.	Order CCHPs	$2,400,000	Complete (Invoice 49)
OS10.	Receive Yoke Substrate	$1,100,000	Complete (Invoice 58)
OS11.	EP Power Components Complete	$1,100,000	Complete (Invoice 65)
OS12.	Structure Composites Fab Complete	$1,100,000	Complete (Invoice 54)

P33.	RESERVED		
P34.	RESERVED		
P35.	T&C Subsystem to Integration	$4,100,000	Complete (Invoice 68r)
P36.	RESERVED		
P37.	ACS Subsystem to Integration	$5,300,000	Complete (Invoice 73)
P38.	Gate 9 – Bus Module Complete	$4,100,000	10/24/03
P39.	Bus & SEM Instruments Integration & Test Complete	$3,100,000	4/1/04
P40.	RESERVED		
P41.	RESERVED		
P42.	Gate 12 - S/C to System Test	$2,200,000	2/1/04
P43.	GFE Integration	$2,700,000	1/15/04
P44.	Complete EMI/EMC Test	$3,200,000	10/1/04
P45	Preliminary Mission Analysis	$6,500,000	Launch – 12 mos
P46	Mission Unique Design Review #1	$3,300,000	Launch – 11 mos
P47	Final Mission Analysis	$6,000,000	Launch – 6.5 mos
P48	Mission Unique Design Review #2	$4,200,000	Launch – 3 mos
P49	Launch Vehicle Flight Program Verification	$2,000,000	Launch – 10 days
P50	RRP1 Settlement (Clause H.22)	547,938	1/1/07
P51	Complete Fit Check (Launch Vehicle)/ Shock Test	$1,000,000	Launch – 14 mos
P52	Gate 10 Payload Module Test Complete	$1,000,000	10/28/03
P53	End to End Test #2 Complete	$1,000,000	6/21/04
P54	End to End Test #3 Complete	$1,000,000	9/15/04
P55	Spacecraft Pre-Storage Review	$1,000,000	11/10/04
P56	Delta IV Modification Executed by BSS	$2,500,000	Complete (Invoice 59)
P57	Delivery of GOES P EUV to Contractor	$ 500,000	9/1/08
P58	Re-installation of GOES P EUV	$ 191,280	10/1/08

Attachment 2
Changes Pages for
NAS5-98069
Section H

The Government will also consider waivers for spacecraft requirements on spacecraft launched on Delta IV-M (4) (with or without solids) if such waivers result in acceptable margin(s). Such determinations, changes and waivers shall be made at the sole discretion of the Government and shall not be subject to dispute.

(End of clause)

H.3 PRE-DETERMINED ADJUSTMENT FOR LATE DELIVERY

(a) If the engineering handover is delayed by the Contractor by more than 180 days from the EHD in the contract, due to the shutdown of a launch vehicle production line caused by a launch vehicle accident, or due to a failure investigation following a launch vehicle anomaly, the contractor shall pay to the Government, for each calendar day of delay, beginning with the one hundred eighty-first day after the EHD in the contract until the actual engineering handover date of said spacecraft, the sum of $50,000, up to a maximum of $5,000,000 for GOES-N; $2,000,000 for GOES-O; and $2,000,000 for GOES-P.

(b) If the engineering handover is otherwise delayed by the Contractor by more than 80 days **(203 days for GOES N ONLY)** from the EHD in the contract schedule, the contractor shall pay to the Government, for each calendar day of delay, beginning with the eighty-first day after the EHD (204th day for GOES N only)in the contract schedule until the actual engineering handover date of said spacecraft, the sum of $50,000, up to a maximum of $12,000,000 for each spacecraft. The form of payment, whether a contract credit or otherwise, will be determined by the Contracting Officer. **(Mod 103)**

(c) If the engineering handover is delayed by the Contractor for any combination of the reasons set forth in the paragraphs above, (whether simultaneous, overlapping, in succession, etc.), the following provisions apply:

The maximum daily rate per mission is $50,000
The maximum total payment for late delivery due to the reasons set forth in (a) is $5,000,000 for GOES-N; $2,000,000 for GOES-O; and $2,000,000 for GOES-P.
The maximum total payment for late delivery for any one mission is $12M.

(d) Alternatively, if delivery or performance is so delayed, the Government may terminate this contract in whole or in part under the Default-Supply and Service clause in this contract and in that event, the Contractor shall be liable for $50,000 per day, which shall not exceed the maximum of $12,000,000, accruing until the time the Government may reasonably obtain delivery or performance of similar supplies or services. This

F.2 ENGINEERING HANDOVER DATES AND STORAGE DATES

The following dates are defined as the engineering handover dates and the earliest dates at which the spacecraft may be placed into ground storage:

	Earliest Ground Storage Date	Engineering Handover Date
GOES N	January 1, 2002	December 31, 2004
GOES O	January 1, 2003	September 30, 2007
GOES P	January 1, 2005	April 30, 2008

The contractor shall place each GOES spacecraft or replacement spacecraft into storage, if required, at the contractor's facility immediately following successful completion of spacecraft Integration and Test (I&T) (including integration and test of the delivered GFE instruments) and successful completion of the pre-storage review, but no earlier than the dates specified for Earliest Storage Date (ESD). No storage charges, as defined in Clause H.4, shall be paid prior to the ESD or for any storage resulting from delays in the Contractor-provided launch.

(End of clause)

F.3 SECTION F CLAUSES INCORPORATED BY REFERENCE

(52.242-15) STOP-WORK ORDER (AUG 1989)
(52.247-34) F.O.B. DESTINATION (NOV 1991)

(End of By Reference Section)

clause shall not diminish any rights to which the Government is entitled under the Default clause or any other clause of this contract.
(e) The Contractor shall not be charged with late delivery fees or liquidated damages when the delay in delivery or performance arises out of causes beyond the control and without the fault or negligence of the Contractor as defined in the Default--(Fixed Price Supply and Service) (FAR 52.249-8) clause in this contract. Delay in delivery or performance due solely to the lack of availability of the Deep Space Network (DSN) shall be considered to be beyond the control and without the fault or negligence of the contractor for the purposes of this clause. The Contractor shall not be entitled to an equitable adjustment for any failure or non-availability of the DSN.
(f) If the re-design and re-manufacture of the EUV instrument being conducted under this effort results in an impact to the EHD , the EHD will be adjusted on a day-to-day basis. In addition, the $2,000,000 Contractor component of the cap in Part 2.a.i of modification 118, shall be reduced by $7,000 per day of EHD adjustment if this adjustment occurs after the EHD notification date in Clause F.2 to offset the financial impact of the delay in payment of the launch related performance based payments.

(End of Clause)

H.4 ADDITIONAL GOVERNMENT ACCOMMODATIONS

a. RESERVED
b. For reasons other than the condition stated in paragraph a. above, the Government may delay the spacecraft test program by no more than thirty (30) days, twenty-eight (28) days for GOES N only, for late instrument deliveries or additional instrument accommodations. If this delay exceeds thirty (30) days, twenty-eight (28) days for GOES N only, the Government shall adjust the engineering handover date, for that spacecraft, on a day-for-day basis. The Government shall also pay to the contractor, for each spacecraft or replacement spacecraft, the daily rate below for the specified instrument.

In the event that the SXI flight instrument is delivered to the contractor in time to integrate it to the yoke prior to the GOES N Yoke Electrical Tests without delay to those tests, the contractor shall not be required to integrate the SXI engineering model and shall proceed directly to SXI flight instrument integration. In that case, the allowable Government delay of spacecraft test reverts back to thirty (30) days for GOES N.

	GOES N	GOES O	GOES P
SXI	$ 24,000	$ 25,000	$ 18,000
Other	$ 24,000	$ 25,000	$ 18,000

This rate applies to each calendar day of delay beginning with the thirty-first day from the originally specified delivery date until the actual date of said delivery. The prices in this paragraph may be impacted by Clause H.18.

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE

PAGE 1 OF PAGES 2

2. AMENDMENT/MODIFICATION NO. 128

3. EFFECTIVE DATE See Blk 16

4. REQUISITION/PURCHASE REQ. NO. N/A

5. PROJECT NO. (If applicable) GOES O

6. ISSUED BY CODE 210.Y

NASA/Goddard Space Flight Center
Bldg 6, Room W246
Greenbelt, Maryland 20771

7. ADMINISTERED BY (If other than Item 6) CODE

NASA Goddard Space Flight Center
Code 210.7
Greenbelt, MD 20771

8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP: Code)

Boeing Satellite Systems Inc,
P.O. Box 92919
Los Angeles, California
Attn: Mr. Scott Ingersoll, NASA Contracts Manager

CODE

FACILITY CODE

(4) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X 10A. MODIFICATION OF CONTRACT/ORDER NO. NAS5-98069

10B. DATED (SEE ITEM 13) Jan 28, 1998

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

N/A Amt: $0.00

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4)

A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

X D. OTHER Specify type of modification and authority)
Clause H.4--Additional Goverment. Accommodations

E. IMPORTANT: Contractor XXX is not, is required to sign this document and return ____copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

The purpose of this modification is to revise the Engineering Handover Date identified in clause F. 2 for the GOES O Spacecraft.

Accordingly:

Except at provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
Glenn Stewart

15B. CONTRACTOR/OFFEROR

(Signature of person authorized to sign)

15C. DATE SIGNED

16B. UNITED STATES OF AMERICA
BY
(Signature of Contracting Officer)

16C. DATE SIGNED 4/27/06

1. In accordance with Clause H.4—Additional Government Accommodations, paragraph (g) of contract NAS 5-98069, the Contractor (BSS) is hereby notified of a revision to the Engineering Handover Date (EHD) for the GOES O Spacecraft. This notification serves to fulfill the Government's contractual obligation to amend the contract via modification and to notify the contractor (BSS) of a revised EHD 15 months in advance of the current Engineering Handover Date.

As stated in Clause F.2 of contract NAS 5-98069, the Engineering Handover for GOES O is hereby changed from July 30, 2007 to September 30, 2007.

2. Replace page F-3 with the enclosed revised F-3 change page.

The fixed Price of this contract and the funds allotted for the performance thereof shall not be deemed to be increased by the modification. This modification also represents a complete and equitable settlement for the work associated with this change and releases the Government from any and all liability under this contract for further equitable adjustment attributed to such facts and circumstances giving rise by this modification, except as provided for in Clause H.4(g).

End of Modification